



SEQUENCE LISTING.ST25.txt  
SEQUENCE LISTING

<110> DeAngelis, Paul

Jing, Wei

<120> TARGETED GLYCOSAMINOGLYCAN POLYMERS BY POLYMER GRAFTING AND  
METHODS OF MAKING AND USING SAME

<130> 3554.097

<140> 10/642,248

<141> 2003-08-15

<150> 60/404,356

<151> 2002-08-16

<150> 60/479,432

<151> 2003-06-18

<150> 60/491,362

<151> 2003-07-31

<150> 10/195,908

<151> 2002-07-15

SEQUENCE LISTING.ST25.txt

<150> 09/437,277

<151> 1999-11-01

<150> 60/107,929

<151> 1998-11-11

<150> 09/283,402

<151> 1999-04-01

<150> 60/080,414

<151> 1998-04-02

<150> 09/842,484

<151> 2001-04-25

<150> 60/199,538

<151> 2000-04-25

<150> 10/142,143

<151> 2002-05-08

<150> 60/289,554

<151> 2001-05-08

SEQUENCE LISTING.ST25.txt

<160> 71

<170> PatentIn version 3.1

<210> 1

<211> 2920

<212> DNA

<213> Pasteurella multocida

<400> 1

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccggttagata ttgcaacaca actgttaactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttgggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa

SEQUENCE LISTING.ST25.txt

600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcgggcg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcaactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagg



SEQUENCE LISTING.ST25.txt

1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatata aaatcatcca gaataaagat gccaaaatcg cagtcagtat tttttatccc  
2160

aatacattaa acggcttagt gaaaaaacta aacaatatta ttgaatataa taaaaatata  
2220

ttcgttattg ttctacatgt tgataagaat catcttacac cagatatcaa aaaagaaata  
2280

ctagccttct atcataaaca tcaagtgaat attttactaa ataatgatat ctcatattac  
2340

acgagtaata gattaataaa aactgaggcg catttaagta atattaataa attaagtcag  
2400

ttaaatctaa attgtgaata catcattttt gataatcatg acagcctatt cgttaaaaat  
2460

gacagctatg cttatatgaa aaaatatgat gtcggcatga atttctcagc attaacacat

SEQUENCE LISTING.ST25.txt

2520

gattggatcg agaaaatcaa tgcgcatcca ccatttaaaa agctcattaa aacttatttt  
2580

aatgacaatg acttaaaaag tatgaatgtg aaaggggcat cacaaggtat gtttatgacg  
2640

tatgcgctag cgcgatgagct tctgacgatt attaaagaag tcatcacatc ttgccagtca  
2700

attgatagtg tgccagaata taacactgag gatatttggg tccaatttgc acttttaatc  
2760

ttagaaaaga aaaccggcca tgtattttaat aaaacatcga ccctgactta tatgccttgg  
2820

gaacgaaaat tacaatggac aaatgaacaa attgaaagtg caaaaagagg agaaaatata  
2880

cctgttaaca agttcattat taatagtata actctataaa  
2920

<210> 2

<211> 972

<212> PRT

<213> Pasteurella multocida

<400> 2

Met	Asn	Thr	Leu	Ser	Gln	Ala	Ile	Lys	Ala	Tyr	Asn	Ser	Asn	Asp	Tyr
1				5				10						15	

Gln	Leu	Ala	Leu	Lys	Leu	Phe	Glu	Lys	Ser	Ala	Glu	Ile	Tyr	Gly	Arg
			20					25					30		

Lys	Ile	Val	Glu	Phe	Gln	Ile	Thr	Lys	Cys	Lys	Glu	Lys	Leu	Ser	Ala
		35					40					45			

SEQUENCE LISTING.ST25.txt

His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys  
50 55 60

Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu  
65 70 75 80

Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu  
85 90 95

Lys Asn Lys Trp Lys Leu Leu Thr Glu Lys Lys Ser Glu Asn Ala Glu  
100 105 110

Val Arg Ala Val Ala Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val  
115 120 125

Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Lys  
130 135 140

Arg Lys Lys Arg Leu Gly Ile Lys Pro Glu His Gln His Val Gly Leu  
145 150 155 160

Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr  
165 170 175

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile  
180 185 190

Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln  
195 200 205

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly  
210 215 220

Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr  
225 230 235 240

SEQUENCE LISTING.ST25.txt

Asp Phe Ile Gly Leu Leu Asp Cys Asp Met Ala Pro Asn Pro Leu Trp  
245 250 255

Val His Ser Tyr Val Ala Glu Leu Leu Glu Asp Asp Asp Leu Thr Ile  
260 265 270

Ile Gly Pro Arg Lys Tyr Ile Asp Thr Gln His Ile Asp Pro Lys Asp  
275 280 285

Phe Leu Asn Asn Ala Ser Leu Leu Glu Ser Leu Pro Glu Val Lys Thr  
290 295 300

Asn Asn Ser Val Ala Ala Lys Gly Glu Gly Thr Val Ser Leu Asp Trp  
305 310 315 320

Arg Leu Glu Gln Phe Glu Lys Thr Glu Asn Leu Arg Leu Ser Asp Ser  
325 330 335

Pro Phe Arg Phe Phe Ala Ala Gly Asn Val Ala Phe Ala Lys Lys Trp  
340 345 350

Leu Asn Lys Ser Gly Phe Phe Asp Glu Glu Phe Asn His Trp Gly Gly  
355 360 365

Glu Asp Val Glu Phe Gly Tyr Arg Leu Phe Arg Tyr Gly Ser Phe Phe  
370 375 380

Lys Thr Ile Asp Gly Ile Met Ala Tyr His Gln Glu Pro Pro Gly Lys  
385 390 395 400

Glu Asn Glu Thr Asp Arg Glu Ala Gly Lys Asn Ile Thr Leu Asp Ile  
405 410 415

Met Arg Glu Lys Val Pro Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu  
420 425 430

SEQUENCE LISTING.ST25.txt

Asp Ser His Ile Asn Arg Val Pro Leu Val Ser Ile Tyr Ile Pro Ala  
435 440 445

Tyr Asn Cys Ala Asn Tyr Ile Gln Arg Cys Val Asp Ser Ala Leu Asn  
450 455 460

Gln Thr Val Val Asp Leu Glu Val Cys Ile Cys Asn Asp Gly Ser Thr  
465 470 475 480

Asp Asn Thr Leu Glu Val Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg  
485 490 495

Val Arg Ile Met Ser Lys Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn  
500 505 510

Ala Ala Val Ser Phe Ala Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser  
515 520 525

Asp Asp Tyr Leu Glu Pro Asp Ala Val Glu Leu Cys Leu Lys Glu Phe  
530 535 540

Leu Lys Asp Lys Thr Leu Ala Cys Val Tyr Thr Thr Asn Arg Asn Val  
545 550 555 560

Asn Pro Asp Gly Ser Leu Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe  
565 570 575

Ser Arg Glu Lys Leu Thr Thr Ala Met Ile Ala His His Phe Arg Met  
580 585 590

Phe Thr Ile Arg Ala Trp His Leu Thr Asp Gly Phe Asn Glu Lys Ile  
595 600 605

Glu Asn Ala Val Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly  
610 615 620

SEQUENCE LISTING.ST25.txt

Lys Phe Lys His Leu Asn Lys Ile Cys Tyr Asn Arg Val Leu His Gly  
625 630 635 640

Asp Asn Thr Ser Ile Lys Lys Leu Gly Ile Gln Lys Lys Asn His Phe  
645 650 655

Val Val Val Asn Gln Ser Leu Asn Arg Gln Gly Ile Thr Tyr Tyr Asn  
660 665 670

Tyr Asp Glu Phe Asp Asp Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn  
675 680 685

Lys Thr Ala Glu Tyr Gln Glu Glu Ile Asp Ile Leu Lys Asp Ile Lys  
690 695 700

Ile Ile Gln Asn Lys Asp Ala Lys Ile Ala Val Ser Ile Phe Tyr Pro  
705 710 715 720

Asn Thr Leu Asn Gly Leu Val Lys Lys Leu Asn Asn Ile Ile Glu Tyr  
725 730 735

Asn Lys Asn Ile Phe Val Ile Val Leu His Val Asp Lys Asn His Leu  
740 745 750

Thr Pro Asp Ile Lys Lys Glu Ile Leu Ala Phe Tyr His Lys His Gln  
755 760 765

Val Asn Ile Leu Leu Asn Asn Asp Ile Ser Tyr Tyr Thr Ser Asn Arg  
770 775 780

Leu Ile Lys Thr Glu Ala His Leu Ser Asn Ile Asn Lys Leu Ser Gln  
785 790 795 800

Leu Asn Leu Asn Cys Glu Tyr Ile Ile Phe Asp Asn His Asp Ser Leu  
805 810 815

SEQUENCE LISTING.ST25.txt

Phe Val Lys Asn Asp Ser Tyr Ala Tyr Met Lys Lys Tyr Asp Val Gly  
820 825 830

Met Asn Phe Ser Ala Leu Thr His Asp Trp Ile Glu Lys Ile Asn Ala  
835 840 845

His Pro Pro Phe Lys Lys Leu Ile Lys Thr Tyr Phe Asn Asp Asn Asp  
850 855 860

Leu Lys Ser Met Asn Val Lys Gly Ala Ser Gln Gly Met Phe Met Thr  
865 870 875 880

Tyr Ala Leu Ala His Glu Leu Leu Thr Ile Ile Lys Glu Val Ile Thr  
885 890 895

Ser Cys Gln Ser Ile Asp Ser Val Pro Glu Tyr Asn Thr Glu Asp Ile  
900 905 910

Trp Phe Gln Phe Ala Leu Leu Ile Leu Glu Lys Lys Thr Gly His Val  
915 920 925

Phe Asn Lys Thr Ser Thr Leu Thr Tyr Met Pro Trp Glu Arg Lys Leu  
930 935 940

Gln Trp Thr Asn Glu Gln Ile Glu Ser Ala Lys Arg Gly Glu Asn Ile  
945 950 955 960

Pro Val Asn Lys Phe Ile Ile Asn Ser Ile Thr Leu  
965 970

<210> 3

<211> 2979

<212> DNA

<213> Pasteurella multocida

SEQUENCE LISTING.ST25.txt

<400> 3

ttataaactg attaaagaag gtaaacgatt caagcaaggt taatttttaa aggaaagaaa  
60

atgaatacat tatcacaagc aataaaagca tataacagca atgactatga attagcactc  
120

aaattatttg agaagtctgc tgaaacctac gggcgaaaaa tcgttgaatt ccaaattatc  
180

aaatgtaaag aaaaactctc gaccaattct tatgtaagtg aagataaaaa aaacagtgtt  
240

tgcgatagct cattagatat cgcaacacag ctcttacttt ccaacgtaaa aaaattaact  
300

ctatccgaat cagaaaaaaa cagtttaaaa aataaatgga aatctatcac tgggaaaaaa  
360

tccgagaacg cagaaatcag aaaggtggaa ctagtaccba aagattttcc taaagatctt  
420

gttcttgctc cattgccaga tcatgttaat gattttacat ggtacaaaaa tcgaaaaaaa  
480

agcttaggta taaagcctgt aaataagaat atcgggtcttt ctattattat tcctacattt  
540

aatcgtagcc gtattttaga tataacgtta gcctgtttgg tcaatcagaa aacaaactac  
600

ccatttgaag tcgttggtgc agatgatggg agtaaggaaa acttacttac cattgtgcaa  
660

aaatacgaac aaaaacttga cataaagtat gtaagacaaa aagattatgg atatcaattg  
720

tgtgcagtca gaaacttagg ttacgtaca gcaaagtatg attttgtctc gattctagac  
780

tgcgatatgg caccacaaca attatgggtt cattcttatt ttacagaact attagaagac  
840

aatgatattg ttttaattgg acctagaaaa tatgtggata ctcataatat taccgcagaa  
900



SEQUENCE LISTING.ST25.txt

caattcctta acgatccata tttaatagaa tcactacctg aaaccgctac aaataacaat  
960

ccttcgatta catcaaaagg aaatatatcg ttggattgga gattagaaca tttcaaaaaa  
1020

accgataatc tacgtctatg tgattctccg tttcggttatt ttagttgcgg taatgttgca  
1080

ttttctaaag aatggctaaa taaagtaggt tggttcgatg aagaatttaa tcattggggg  
1140

ggcgaagatg tagaatttgg ttacagatta tttgccaaag gctgtttttt cagagtaatt  
1200

gacggcgga tggcatacca tcaagaacca cctggtaaag aaaatgaaac agaccgcgaa  
1260

gctggtaaaa gtattacgct taaaattgtg aaagaaaagg taccttacat ctatagaaag  
1320

cttttacc aa tagaagattc acatattcat agaatacctt tagtttctat ttatatcccc  
1380

gcttataact gtgcaaatta tattcaaaga tgtgtagata gtgctcttaa tcaaactggt  
1440

gtcgatctcg aggtttgtat ttgtaacgat ggttcaacag ataatacctt agaagtgatc  
1500

aataagcttt atggtaataa tcctagggtg cgcacatcatgt ctaaaccaaa tggcgggaata  
1560

gcctcagcat caaatgcagc cgtttctttt gctaaagggtt attacattgg gcagttagat  
1620

tcagatgatt atcttgagcc tgatgcagtt gaactgtggt taaaagaatt tttaaagat  
1680

aaaacgctag ctgtgtgtta taccactaat agaaacgtca atccggatgg tagcttaatc  
1740

gctaattggtt acaattggcc agaattttca cgagaaaaac tcacaacggc tatgattgct  
1800

caccatttta gaatgtttac gattagagct tggcatttaa cggatggatt taacgaaaat  
1860

SEQUENCE LISTING.ST25.txt

attgaaaacg ccgtggatta tgacatgttc cttaaactca gtgaagttgg aaaatttaaa  
1920

catcttaata aaatctgcta taaccgcgta ttacatggtg ataacacatc cattaagaaa  
1980

ctcggcattc aaaagaaaaa ccattttggt gtagtcaatc agtcattaaa tagacaaggc  
2040

atcaattatt ataattatga caaatttgat gatttagatg aaagtagaaa gtatatcttc  
2100

aataaaaccg ctgaatatca agaagaaatg gatattttta aagatcttaa actcattcaa  
2160

aataaagatg ccaaaatcgc agtcagtatt ttctatccca atacattaaa cggcttagtg  
2220

aaaaaactaa acaatattat tgaatataat aaaaatatat tcgttattat tctacatggt  
2280

gataagaatc atcttacacc agacatcaaa aaagaaatat tggctttcta tcataagcac  
2340

caagtgaata ttttactaaa taatgacatc tcatattaca cgagtaatag actaataaaa  
2400

actgaggcac atttaagtaa tattaataaa ttaagtcagt taaatctaaa ttgtgaatac  
2460

atcatttttg ataatcatga cagcctattc gttaaaaatg acagctatgc ttatatgaaa  
2520

aaatatgatg tcggcatgaa tttctcagca ttaacacatg attggatcga gaaaatcaat  
2580

gcgcatccac catttaaaaa gctgattaaa acctatttta atgacaatga cttaagaagt  
2640

atgaatgtga aaggggcatc acaaggatg tttatgaagt atgcgctacc gcatgagctt  
2700

ctgacgatta ttaaagaagt catcacatcc tgccaatcaa ttgatagtgt gccagaatat  
2760

aacactgagg atatttggtt ccaatttgca cttttaatct tagaaaagaa aaccggccat  
2820

SEQUENCE LISTING.ST25.txt

gtattttaata aaacatcgac cctgacttat atgccttggg aacgaaaatt acaatggaca  
2880

aatgaacaaa ttcaaagtgc aaaaaaaggc gaaaatatcc ccgttaacaa gttcattatt  
2940

aatagtataa cgctataaaa catttgcatt ttattaaaa  
2979

<210> 4

<211> 965

<212> PRT

<213> Pasteurella multocida

<400> 4

Met	Asn	Thr	Leu	Ser	Gln	Ala	Ile	Lys	Ala	Tyr	Asn	Ser	Asn	Asp	Tyr
1				5				10						15	

Glu	Leu	Ala	Leu	Lys	Leu	Phe	Glu	Lys	Ser	Ala	Glu	Thr	Tyr	Gly	Arg
			20					25						30	

Lys	Ile	Val	Glu	Phe	Gln	Ile	Ile	Lys	Cys	Lys	Glu	Lys	Leu	Ser	Thr
		35					40					45			

Asn	Ser	Tyr	Val	Ser	Glu	Asp	Lys	Lys	Asn	Ser	Val	Cys	Asp	Ser	Ser
	50					55					60				

Leu	Asp	Ile	Ala	Thr	Gln	Leu	Leu	Leu	Ser	Asn	Val	Lys	Lys	Leu	Thr
65					70					75					80

Leu	Ser	Glu	Ser	Glu	Lys	Asn	Ser	Leu	Lys	Asn	Lys	Trp	Lys	Ser	Ile
				85					90					95	

Thr	Gly	Lys	Lys	Ser	Glu	Asn	Ala	Glu	Ile	Arg	Lys	Val	Glu	Leu	Val
			100					105					110		

SEQUENCE LISTING.ST25.txt

Pro Lys Asp Phe Pro Lys Asp Leu Val Leu Ala Pro Leu Pro Asp His  
115 120 125

Val Asn Asp Phe Thr Trp Tyr Lys Asn Arg Lys Lys Ser Leu Gly Ile  
130 135 140

Lys Pro Val Asn Lys Asn Ile Gly Leu Ser Ile Ile Ile Pro Thr Phe  
145 150 155 160

Asn Arg Ser Arg Ile Leu Asp Ile Thr Leu Ala Cys Leu Val Asn Gln  
165 170 175

Lys Thr Asn Tyr Pro Phe Glu Val Val Val Ala Asp Asp Gly Ser Lys  
180 185 190

Glu Asn Leu Leu Thr Ile Val Gln Lys Tyr Glu Gln Lys Leu Asp Ile  
195 200 205

Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln Leu Cys Ala Val Arg  
210 215 220

Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe Val Ser Ile Leu Asp  
225 230 235 240

Cys Asp Met Ala Pro Gln Gln Leu Trp Val His Ser Tyr Leu Thr Glu  
245 250 255

Leu Leu Glu Asp Asn Asp Ile Val Leu Ile Gly Pro Arg Lys Tyr Val  
260 265 270

Asp Thr His Asn Ile Thr Ala Glu Gln Phe Leu Asn Asp Pro Tyr Leu  
275 280 285

Ile Glu Ser Leu Pro Glu Thr Ala Thr Asn Asn Asn Pro Ser Ile Thr  
290 295 300

SEQUENCE LISTING.ST25.txt

Ser Lys Gly Asn Ile Ser Leu Asp Trp Arg Leu Glu His Phe Lys Lys  
305 310 315 320

Thr Asp Asn Leu Arg Leu Cys Asp Ser Pro Phe Arg Tyr Phe Ser Cys  
325 330 335

Gly Asn Val Ala Phe Ser Lys Glu Trp Leu Asn Lys Val Gly Trp Phe  
340 345 350

Asp Glu Glu Phe Asn His Trp Gly Gly Glu Asp Val Glu Phe Gly Tyr  
355 360 365

Arg Leu Phe Ala Lys Gly Cys Phe Phe Arg Val Ile Asp Gly Gly Met  
370 375 380

Ala Tyr His Gln Glu Pro Pro Gly Lys Glu Asn Glu Thr Asp Arg Glu  
385 390 395 400

Ala Gly Lys Ser Ile Thr Leu Lys Ile Val Lys Glu Lys Val Pro Tyr  
405 410 415

Ile Tyr Arg Lys Leu Leu Pro Ile Glu Asp Ser His Ile His Arg Ile  
420 425 430

Pro Leu Val Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala Asn Tyr Ile  
435 440 445

Gln Arg Cys Val Asp Ser Ala Leu Asn Gln Thr Val Val Asp Leu Glu  
450 455 460

Val Cys Ile Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu Glu Val Ile  
465 470 475 480

Asn Lys Leu Tyr Gly Asn Asn Pro Arg Val Arg Ile Met Ser Lys Pro  
485 490 495

SEQUENCE LISTING.ST25.txt

Asn	Gly	Gly	Ile	Ala	Ser	Ala	Ser	Asn	Ala	Ala	Val	Ser	Phe	Ala	Lys	500	505	510
Gly	Tyr	Tyr	Ile	Gly	Gln	Leu	Asp	Ser	Asp	Asp	Tyr	Leu	Glu	Pro	Asp	515	520	525
Ala	Val	Glu	Leu	Cys	Leu	Lys	Glu	Phe	Leu	Lys	Asp	Lys	Thr	Leu	Ala	530	535	540
Cys	Val	Tyr	Thr	Thr	Asn	Arg	Asn	Val	Asn	Pro	Asp	Gly	Ser	Leu	Ile	545	550	555
Ala	Asn	Gly	Tyr	Asn	Trp	Pro	Glu	Phe	Ser	Arg	Glu	Lys	Leu	Thr	Thr	565	570	575
Ala	Met	Ile	Ala	His	His	Phe	Arg	Met	Phe	Thr	Ile	Arg	Ala	Trp	His	580	585	590
Leu	Thr	Asp	Gly	Phe	Asn	Glu	Asn	Ile	Glu	Asn	Ala	Val	Asp	Tyr	Asp	595	600	605
Met	Phe	Leu	Lys	Leu	Ser	Glu	Val	Gly	Lys	Phe	Lys	His	Leu	Asn	Lys	610	615	620
Ile	Cys	Tyr	Asn	Arg	Val	Leu	His	Gly	Asp	Asn	Thr	Ser	Ile	Lys	Lys	625	630	635
Leu	Gly	Ile	Gln	Lys	Lys	Asn	His	Phe	Val	Val	Val	Asn	Gln	Ser	Leu	645	650	655
Asn	Arg	Gln	Gly	Ile	Asn	Tyr	Tyr	Asn	Tyr	Asp	Lys	Phe	Asp	Asp	Leu	660	665	670
Asp	Glu	Ser	Arg	Lys	Tyr	Ile	Phe	Asn	Lys	Thr	Ala	Glu	Tyr	Gln	Glu	675	680	685

SEQUENCE LISTING.ST25.txt

Glu Met Asp Ile Leu Lys Asp Leu Lys Leu Ile Gln Asn Lys Asp Ala  
690 695 700

Lys Ile Ala Val Ser Ile Phe Tyr Pro Asn Thr Leu Asn Gly Leu Val  
705 710 715 720

Lys Lys Leu Asn Asn Ile Ile Glu Tyr Asn Lys Asn Ile Phe Val Ile  
725 730 735

Ile Leu His Val Asp Lys Asn His Leu Thr Pro Asp Ile Lys Lys Glu  
740 745 750

Ile Leu Ala Phe Tyr His Lys His Gln Val Asn Ile Leu Leu Asn Asn  
755 760 765

Asp Ile Ser Tyr Tyr Thr Ser Asn Arg Leu Ile Lys Thr Glu Ala His  
770 775 780

Leu Ser Asn Ile Asn Lys Leu Ser Gln Leu Asn Leu Asn Cys Glu Tyr  
785 790 795 800

Ile Ile Phe Asp Asn His Asp Ser Leu Phe Val Lys Asn Asp Ser Tyr  
805 810 815

Ala Tyr Met Lys Lys Tyr Asp Val Gly Met Asn Phe Ser Ala Leu Thr  
820 825 830

His Asp Trp Ile Glu Lys Ile Asn Ala His Pro Pro Phe Lys Lys Leu  
835 840 845

Ile Lys Thr Tyr Phe Asn Asp Asn Asp Leu Arg Ser Met Asn Val Lys  
850 855 860

Gly Ala Ser Gln Gly Met Phe Met Lys Tyr Ala Leu Pro His Glu Leu  
865 870 875 880

SEQUENCE LISTING.ST25.txt

Leu Thr Ile Ile Lys Glu Val Ile Thr Ser Cys Gln Ser Ile Asp Ser  
885 890 895

Val Pro Glu Tyr Asn Thr Glu Asp Ile Trp Phe Gln Phe Ala Leu Leu  
900 905 910

Ile Leu Glu Lys Lys Thr Gly His Val Phe Asn Lys Thr Ser Thr Leu  
915 920 925

Thr Tyr Met Pro Trp Glu Arg Lys Leu Gln Trp Thr Asn Glu Gln Ile  
930 935 940

Gln Ser Ala Lys Lys Gly Glu Asn Ile Pro Val Asn Lys Phe Ile Ile  
945 950 955 960

Asn Ser Ile Thr Leu  
965

<210> 5

<211> 1851

<212> DNA

<213> Pasteurella multocida

<400> 5

atgagcttat ttaaactgtc tactgagcta ttaagtcag gaaactataa agatgcacta  
60

actctatatg aaaatatagc taaaatttat gggttcagaaa gccttggttaa atataatatt  
120

gatatatgta aaaaaaatat aacacaatca aaaagtaata aaatagaaga agataatatt  
180

tctggagaaa acaaattttc agtatcaata aaagatctat ataacgaaat aagcaatagt  
240



SEQUENCE LISTING.ST25.txt

gaattaggga ttacaaaaga aagactagga gccccccctc tagtcagtat tataatgact  
300

tctcataata cagaaaaatt cattgaagcc tcaattaatt cactattatt gcaaacatac  
360

aataacttag aagttatcgt tgtagatgat tatagcacag ataaaacatt tcagatcgca  
420

tccagaatag caaactctac aagtaaagta aaaacattcc gattaaactc aaatctaggg  
480

acatactttg cgaaaaatac aggaatttta aagtctaaag gagatattat tttctttcag  
540

gatagcgatg atgtatgtca ccatgaaaga atcgaaagat gtgttaatgc attattatcg  
600

aataaagata atatagctgt tagatgtgca tattctagaa taaatctaga aacacaaaat  
660

ataataaaag ttaatgataa taaatacaaa ttaggattaa taactttagg cgtttataga  
720

aaagtattta atgaaattgg tttttttaac tgcacaacca aagcatcgga tgatgaattt  
780

tatcatagaa taattaaata ctatggtaaa aataggataa ataacttatt tctaccactg  
840

tattataaca caatgcgtga agattcatta ttttctgata tggttgagtg ggtagatgaa  
900

aataatataa agcaaaaaac ctctgatgct agacaaaatt atctccatga attccaaaaa  
960

atacacaatg aaaggaaatt aaatgaatta aaagagattt ttagctttcc tagaattcat  
1020

gacgccttac ctatatcaaa agaaatgagt aagctcagca accctaaaat tcctgtttat  
1080

ataaatatat gctcaatacc ttcaagaata aaacaacttc aatacactat tggagtacta  
1140

aaaaccaat gcgatcattt tcatatttat cttgatggat atccagaagt acctgatttt  
1200

SEQUENCE LISTING.ST25.txt

ataaaaaaac tagggaataa agcgaccgtt attaattgtc aaaacaaaaa tgagtctatt  
1260

agagataatg gaaagtttat tctattagaa aaacttataa aggaaaataa agatggatat  
1320

tatataactt gtgatgatga tatccggtat cctgctgact acacaaacac tatgataaaa  
1380

aaaattaata aatacaatga taaagcagca attggattac atgggtgttat attcccaagt  
1440

agagtcaaca agtatTTTTc atcagacaga attgtctata atTTTcaaaa acctttagaa  
1500

aatgatactg ctgtaaatat attaggaact ggaactgttg cctttagagt atctatTTTT  
1560

aataaatTTT ctctatctga tTTtgagcat cctggcatgg tagatatcta tTTTctata  
1620

ctatgtaaga aaaacaatat actccaagtt tgtatatcac gaccatcgaa ttggctaaca  
1680

gaagataaca aaaacactga gaccttattt catgaattcc aaaatagaga tgaaatacaa  
1740

agtaaactca ttatTTTcaaa caacccttgg ggataactcaa gtatatatcc actattaaat  
1800

aataatgcta attattctga acttattccg tgTTTatctt tttataacga g  
1851

<210> 6

<211> 615

<212> PRT

<213> Pasteurella multocida

<400> 6

Met Ser Leu Phe Lys Arg Ala Thr Glu Leu Phe Lys Ser Gly Asn Tyr

SEQUENCE LISTING.ST25.txt

1	5	10	15
Lys Asp Ala Leu Thr Leu Tyr Glu Asn Ile Ala Lys Ile Tyr Gly Ser	20	25	30
Glu Ser Leu Val Lys Tyr Asn Ile Asp Ile Cys Lys Lys Asn Ile Thr	35	40	45
Gln Ser Lys Ser Asn Lys Ile Glu Glu Asp Asn Ile Ser Gly Glu Asn	50	55	60
Lys Phe Ser Val Ser Ile Lys Asp Leu Tyr Asn Glu Ile Ser Asn Ser	65	70	75
Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser	85	90	95
Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile	100	105	110
Asn Ser Leu Leu Leu Gln Thr Tyr Asn Leu Glu Val Ile Val Val Asp	115	120	125
Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala Asn	130	135	140
Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly Thr	145	150	155
Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile Ile	165	170	175
Phe Phe Gln Ser Asp Asp Val Cys His His Glu Arg Ile Glu Arg Cys	180	185	190
Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg Cys Ala			

SEQUENCE LISTING.ST25.txt

195

200

205

Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val Asn Asp  
210 215 220

Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu Gly Val Tyr Arg Lys Val  
225 230 235 240

Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys Ala Ser Asp Asp  
245 250 255

Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg Ile Asn  
260 265 270

Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr Met Arg Glu Asp Ser Leu  
275 280 285

Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys Gln Lys  
290 295 300

Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys Ile His  
305 310 315 320

Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu Ile Phe Ser Phe Pro Arg  
325 330 335

Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu Ser Asn  
340 345 350

Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser Arg Ile  
355 360 365

Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys Asp His  
370 375 380

Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe Ile Lys

SEQUENCE LISTING.ST25.txt

385 390 395 400

Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys Asn Glu  
405 410 415

Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu Ile Lys  
420 425 430

Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Asp Ile Arg Tyr  
435 440 445

Pro Ala Asp Tyr Thr Asn Thr Met Ile Lys Lys Ile Asn Lys Tyr Asn  
450 455 460

Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser Arg Val  
465 470 475 480

Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val Tyr Asn Phe Gln Lys Pro  
485 490 495

Leu Glu Asn Asp Thr Ala Val Asn Ile Leu Gly Thr Gly Thr Val Ala  
500 505 510

Phe Arg Val Ser Ile Phe Asn Lys Phe Ser Leu Ser Asp Phe Glu His  
515 520 525

Pro Gly Met Val Asp Ile Tyr Phe Ser Ile Leu Cys Lys Lys Asn Asn  
530 535 540

Ile Leu Gln Val Cys Ile Ser Arg Pro Ser Asn Trp Leu Thr Glu Asp  
545 550 555 560

Asn Lys Asn Thr Glu Thr Leu Phe His Glu Phe Gln Asn Arg Asp Glu  
565 570 575

Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn Pro Trp Gly Tyr Ser Ser

SEQUENCE LISTING.ST25.txt

580

585

590

Ile Tyr Pro Leu Leu Asn Asn Asn Ala Asn Tyr Ser Glu Leu Ile Pro  
595 600 605

Cys Leu Ser Phe Tyr Asn Glu  
610 615

<210> 7

<211> 1940

<212> DNA

<213> Pasteurella multocida

<400> 7

aacaggggat aaggtcagta aatttaggat gatttttgac taatggataa atacttgaat  
60

atcccatg accgttttcc atgatcagct gagtttggtg ctcatcattg tctcgatatt  
120

gatgatagag tgtttcgctg tctctattat cttccgttag ccagtttgct ggtcttgaaa  
180

tacaaatctg aagaatatta tttttcttac acaagagaga gaaatagata tcagccatgc  
240

ctgaatgggt aaagtcagaa agagaaaatt gattaaagag actgactcta aagctaacag  
300

ttcctgtacc taatacattg accgctttgt ctttttccag aggtttatag aagctatata  
360

ccagtctatc cgccgaaaaa tatttggtca ttctacttgg aaagagaatg ccgtgtaaac  
420

caataaccgc tttatcatcg tattcattca gcttcttgat catcgtattg atgtaatcgc  
480

ttggatagat aatgtcatca tcacagggtta tataatatcc atcttgattt ttttcaatca  
540

SEQUENCE LISTING.ST25.txt

actcttccag taaaatgaat ttgccattat ctctaataga gttatcttta tctttgcaat  
600

gaacaacggt tgctttatta cctaaatttt ttatgaagtc agggatttct acatagccat  
660

caagataaat atgaaaatga tcacattgat tttttagtat gccgataata cgtcgtaatt  
720

gcgctattct tgagggaata gaacaaatat tgatataaac aggaatctta ggattggaca  
780

acttactcat ttcttgtggt actggtaagg catcgtaaata acgagggaat tgaaaaagat  
840

ttttgaaatc atgtgaggca gtttcgttat gcatcgcttg aaacagggtt gcataatggt  
900

gtctggtatc agacattttc tgtattatgt tatgattgtc tatccattca accatatcag  
960

taaataaaga gttttctctc attgtgttgt agtataacgg caagagtaaa ttttttattt  
1020

tttcttttcc ataatatattc gcaattctat gaaaaaactc atcatctgag ccttttagtcg  
1080

tacaattgaa gaaaccaatt tcttgaaata cttttctgtg cataccaag gttataaaac  
1140

ctaattctata atccatatta ttgactttaa tgatatgttg tgtttctggt gctagtcttg  
1200

agtatgcaca acgaacagca atagtttctt tattagctaa taatatattt acacatcttt  
1260

ctattctttc atgatgacat acatcatcac tatcttgaaa gaaaataatg tcacctttag  
1320

attttaatat gcctgtattt ttcgcaaagt aagttcctag gtttgaattt aatctaaata  
1380

ctctgacttt gcttggttga ttcgctattc tcgaggcaat ttcaaagtga ttatccgagc  
1440

tatcatcatc tacaataata atttctatgt ttttatatgt ttgtaacaat aatgaattaa  
1500

SEQUENCE LISTING.ST25.txt

tagaagcttc gataaattgc gctgtattgt gagatgtcat gataatactg actaatggat  
1560

ttacgctggt ggtttctttg actaacccta aatcactttt agcgacttca ttatataaat  
1620

ctgttattga tgttgtttgc ttatcttttt ctagctttgc ttctaattgct tgattatagg  
1680

tatatatttt ttcaaattct tgcagaacca attggagttg ttttaataaa agtttatttt  
1740

cgttttcaag ggatgcggat agcggatgtt tactgtcctg ttttgccaat aaagtttgtt  
1800

gagaaataat gtctttgttt aaagttgttt ttagactatc aattttattt tgaaagggtg  
1860

tgagttcatt ttctttttca tgttgggggg gatttttagt catttgtttt tgagtcattt  
1920

ctttttttct cttcatttca  
1940

<210> 8

<211> 651

<212> PRT

<213> Pasteurella multocida

<400> 8

Met	Lys	Arg	Lys	Lys	Glu	Met	Thr	Gln	Lys	Gln	Met	Thr	Lys	Asn	Pro
1				5					10					15	

Pro	Gln	His	Glu	Lys	Glu	Asn	Glu	Leu	Asn	Thr	Phe	Gln	Asn	Lys	Ile
			20					25					30		

Asp	Ser	Leu	Lys	Thr	Thr	Leu	Asn	Lys	Asp	Ile	Ile	Ser	Gln	Gln	Thr
		35					40					45			



SEQUENCE LISTING.ST25.txt

Leu	Leu	Ala	Lys	Gln	Asp	Ser	Lys	His	Pro	Leu	Ser	Ala	Ser	Leu	Glu
50						55					60				
Asn	Glu	Asn	Lys	Leu	Leu	Leu	Lys	Gln	Leu	Gln	Leu	Val	Leu	Gln	Glu
65					70					75					80
Phe	Glu	Lys	Ile	Tyr	Thr	Tyr	Asn	Gln	Ala	Leu	Glu	Ala	Lys	Leu	Glu
			85						90					95	
Lys	Asp	Lys	Gln	Thr	Thr	Ser	Ile	Thr	Asp	Leu	Tyr	Asn	Glu	Val	Ala
			100					105					110		
Lys	Ser	Asp	Leu	Gly	Leu	Val	Lys	Glu	Thr	Asn	Ser	Val	Asn	Pro	Leu
		115					120					125			
Val	Ser	Ile	Ile	Met	Thr	Ser	His	Asn	Thr	Ala	Gln	Phe	Ile	Glu	Ala
130						135					140				
Ser	Ile	Asn	Ser	Leu	Leu	Leu	Gln	Thr	Tyr	Lys	Asn	Ile	Glu	Ile	Ile
145					150					155					160
Ile	Val	Asp	Asp	Asp	Ser	Ser	Asp	Asn	Thr	Phe	Glu	Ile	Ala	Ser	Arg
				165					170					175	
Ile	Ala	Asn	Thr	Thr	Ser	Lys	Val	Arg	Val	Phe	Arg	Leu	Asn	Ser	Asn
			180					185					190		
Leu	Gly	Thr	Tyr	Phe	Ala	Lys	Asn	Thr	Gly	Ile	Leu	Lys	Ser	Lys	Gly
		195					200					205			
Asp	Ile	Ile	Phe	Phe	Gln	Asp	Ser	Asp	Asp	Val	Cys	His	His	Glu	Arg
	210					215					220				
Ile	Glu	Arg	Cys	Val	Asn	Ile	Leu	Leu	Ala	Asn	Lys	Glu	Thr	Ile	Ala
225					230					235					240

SEQUENCE LISTING.ST25.txt

Val	Arg	Cys	Ala	Tyr	Ser	Arg	Leu	Ala	Pro	Glu	Thr	Gln	His	Ile	Ile	
				245					250					255		
Lys	Val	Asn	Asn	Met	Asp	Tyr	Arg	Leu	Gly	Phe	Ile	Thr	Leu	Gly	Met	
			260					265					270			
His	Arg	Lys	Val	Phe	Gln	Glu	Ile	Gly	Phe	Phe	Asn	Cys	Thr	Thr	Lys	
		275					280					285				
Gly	Ser	Asp	Asp	Glu	Phe	Phe	His	Arg	Ile	Ala	Lys	Tyr	Tyr	Gly	Lys	
	290						295				300					
Glu	Lys	Ile	Lys	Asn	Leu	Leu	Leu	Pro	Leu	Tyr	Tyr	Asn	Thr	Met	Arg	
305					310					315					320	
Glu	Asn	Ser	Leu	Phe	Thr	Asp	Met	Val	Glu	Trp	Ile	Asp	Asn	His	Asn	
				325					330					335		
Ile	Ile	Gln	Lys	Met	Ser	Asp	Thr	Arg	Gln	His	Tyr	Ala	Thr	Leu	Phe	
			340					345						350		
Gln	Ala	Met	His	Asn	Glu	Thr	Ala	Ser	His	Asp	Phe	Lys	Asn	Leu	Phe	
		355					360					365				
Gln	Phe	Pro	Arg	Ile	Tyr	Asp	Ala	Leu	Pro	Val	Pro	Gln	Glu	Met	Ser	
	370					375					380					
Lys	Leu	Ser	Asn	Pro	Lys	Ile	Pro	Val	Tyr	Ile	Asn	Ile	Cys	Ser	Ile	
385					390					395					400	
Pro	Ser	Arg	Ile	Ala	Gln	Leu	Arg	Arg	Ile	Ile	Gly	Ile	Leu	Lys	Asn	
				405					410					415		
Gln	Cys	Asp	His	Phe	His	Ile	Tyr	Leu	Asp	Gly	Tyr	Val	Glu	Ile	Pro	
			420					425					430			

SEQUENCE LISTING.ST25.txt

Asp	Phe	Ile	Lys	Asn	Leu	Gly	Asn	Lys	Ala	Thr	Val	Val	His	Cys	Lys	
		435					440					445				
Asp	Lys	Asp	Asn	Ser	Ile	Arg	Asp	Asn	Gly	Lys	Phe	Ile	Leu	Leu	Glu	
	450					455					460					
Glu	Leu	Ile	Glu	Lys	Asn	Gln	Asp	Gly	Tyr	Tyr	Ile	Thr	Cys	Asp	Asp	
465					470					475					480	
Asp	Ile	Ile	Tyr	Pro	Ser	Asp	Tyr	Ile	Asn	Thr	Met	Ile	Lys	Lys	Leu	
				485					490					495		
Asn	Glu	Tyr	Asp	Asp	Lys	Ala	Val	Ile	Gly	Leu	His	Gly	Ile	Leu	Phe	
			500					505					510			
Pro	Ser	Arg	Met	Thr	Lys	Tyr	Phe	Ser	Ala	Asp	Arg	Leu	Val	Tyr	Ser	
		515					520					525				
Phe	Tyr	Lys	Pro	Leu	Glu	Lys	Asp	Lys	Ala	Val	Asn	Val	Leu	Gly	Thr	
	530					535					540					
Gly	Thr	Val	Ser	Phe	Arg	Val	Ser	Leu	Phe	Asn	Gln	Phe	Ser	Leu	Ser	
545					550					555					560	
Asp	Phe	Thr	His	Ser	Gly	Met	Ala	Asp	Ile	Tyr	Phe	Ser	Leu	Leu	Cys	
				565					570					575		
Lys	Lys	Asn	Asn	Ile	Leu	Gln	Ile	Cys	Ile	Ser	Arg	Pro	Ala	Asn	Trp	
			580					585					590			
Leu	Thr	Glu	Asp	Asn	Arg	Asp	Ser	Glu	Thr	Leu	Tyr	His	Gln	Tyr	Arg	
		595					600					605				
Asp	Asn	Asp	Glu	Gln	Gln	Thr	Gln	Leu	Ile	Met	Glu	Asn	Gly	Pro	Trp	
	610					615					620					

SEQUENCE LISTING.ST25.txt

Gly Tyr Ser Ser Ile Tyr Pro Leu Val Lys Asn His Pro Lys Phe Thr  
625 630 635 640

Asp Leu Ile Pro Cys Leu Pro Phe Tyr Phe Leu  
645 650

<210> 9

<211> 703

<212> PRT

<213> Pasteurella multocida

<400> 9

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr  
1 5 10 15

Gln Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Ile Tyr Gly Arg  
20 25 30

Lys Ile Val Glu Phe Gln Ile Thr Lys Cys Lys Glu Lys Leu Ser Ala  
35 40 45

His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys  
50 55 60

Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu  
65 70 75 80

Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu  
85 90 95

Lys Asn Lys Trp Lys Leu Leu Thr Glu Lys Lys Ser Glu Asn Ala Glu  
100 105 110

SEQUENCE LISTING.ST25.txt

Val Arg Ala Val Ala Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val  
115 120 125

Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Lys  
130 135 140

Arg Lys Lys Arg Leu Gly Ile Lys Pro Glu His Gln His Val Gly Leu  
145 150 155 160

Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr  
165 170 175

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile  
180 185 190

Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln  
195 200 205

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly  
210 215 220

Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr  
225 230 235 240

Asp Phe Ile Gly Leu Leu Asp Cys Asp Met Ala Pro Asn Pro Leu Trp  
245 250 255

Val His Ser Tyr Val Ala Glu Leu Leu Glu Asp Asp Asp Leu Thr Ile  
260 265 270

Ile Gly Pro Arg Lys Tyr Ile Asp Thr Gln His Ile Asp Pro Lys Asp  
275 280 285

Phe Leu Asn Asn Ala Ser Leu Leu Glu Ser Leu Pro Glu Val Lys Thr  
290 295 300

SEQUENCE LISTING.ST25.txt

Asn Asn Ser Val Ala Ala Lys Gly Glu Gly Thr Val Ser Leu Asp Trp  
305 310 315 320

Arg Leu Glu Gln Phe Glu Lys Thr Glu Asn Leu Arg Leu Ser Asp Ser  
325 330 335

Pro Phe Arg Phe Phe Ala Ala Gly Asn Val Ala Phe Ala Lys Lys Trp  
340 345 350

Leu Asn Lys Ser Gly Phe Phe Asp Glu Glu Phe Asn His Trp Gly Gly  
355 360 365

Glu Asp Val Glu Phe Gly Tyr Arg Leu Phe Arg Tyr Gly Ser Phe Phe  
370 375 380

Lys Thr Ile Asp Gly Ile Met Ala Tyr His Gln Glu Pro Pro Gly Lys  
385 390 395 400

Glu Asn Glu Thr Asp Arg Glu Ala Gly Lys Asn Ile Thr Leu Asp Ile  
405 410 415

Met Arg Glu Lys Val Pro Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu  
420 425 430

Asp Ser His Ile Asn Arg Val Pro Leu Val Ser Ile Tyr Ile Pro Ala  
435 440 445

Tyr Asn Cys Ala Asn Tyr Ile Gln Arg Cys Val Asp Ser Ala Leu Asn  
450 455 460

Gln Thr Val Val Asp Leu Glu Val Cys Ile Cys Asn Asp Gly Ser Thr  
465 470 475 480

Asp Asn Thr Leu Glu Val Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg  
485 490 495

SEQUENCE LISTING.ST25.txt

Val	Arg	Ile	Met	Ser	Lys	Pro	Asn	Gly	Gly	Ile	Ala	Ser	Ala	Ser	Asn	500	505	510
Ala	Ala	Val	Ser	Phe	Ala	Lys	Gly	Tyr	Tyr	Ile	Gly	Gln	Leu	Asp	Ser	515	520	525
Asp	Asp	Tyr	Leu	Glu	Pro	Asp	Ala	Val	Glu	Leu	Cys	Leu	Lys	Glu	Phe	530	535	540
Leu	Lys	Asp	Lys	Thr	Leu	Ala	Cys	Val	Tyr	Thr	Thr	Asn	Arg	Asn	Val	545	550	555
Asn	Pro	Asp	Gly	Ser	Leu	Ile	Ala	Asn	Gly	Tyr	Asn	Trp	Pro	Glu	Phe	565	570	575
Ser	Arg	Glu	Lys	Leu	Thr	Thr	Ala	Met	Ile	Ala	His	His	Phe	Arg	Met	580	585	590
Phe	Thr	Ile	Arg	Ala	Trp	His	Leu	Thr	Asp	Gly	Phe	Asn	Glu	Lys	Ile	595	600	605
Glu	Asn	Ala	Val	Asp	Tyr	Asp	Met	Phe	Leu	Lys	Leu	Ser	Glu	Val	Gly	610	615	620
Lys	Phe	Lys	His	Leu	Asn	Lys	Ile	Cys	Tyr	Asn	Arg	Val	Leu	His	Gly	625	630	635
Asp	Asn	Thr	Ser	Ile	Lys	Lys	Leu	Gly	Ile	Gln	Lys	Lys	Asn	His	Phe	645	650	655
Val	Val	Val	Asn	Gln	Ser	Leu	Asn	Arg	Gln	Gly	Ile	Thr	Tyr	Tyr	Asn	660	665	670
Tyr	Asp	Glu	Phe	Asp	Asp	Leu	Asp	Glu	Ser	Arg	Lys	Tyr	Ile	Phe	Asn	675	680	685

SEQUENCE LISTING.ST25.txt

Lys Thr Ala Glu Tyr Gln Glu Glu Ile Asp Ile Leu Lys Asp Ile  
 690 695 700

<210> 10

<211> 1953

<212> DNA

<213> Pasteurella multocida

<400> 10

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
 60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
 120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
 180

aaagaagaaa aagtcaatgt ttgcgatagt ccggttagata ttgcaacaca actgttactt  
 240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
 300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
 360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
 420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
 480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
 540

gtaaacaaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
 600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa



SEQUENCE LISTING.ST25.txt

660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcaagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tgggtcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt

SEQUENCE LISTING.ST25.txt

1620

ttaaaagaat ttttaaaaga taaaacgcta gcttggtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgttc cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caa  
1953

<210> 11

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 11

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccggttagata ttgcaacaca actggttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca

SEQUENCE LISTING.ST25.txt

360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtcctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct

SEQUENCE LISTING.ST25.txt

1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacaa tgggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 12

<211> 2112

SEQUENCE LISTING.ST25.txt

<212> DNA

<213> Pasteurella multocida

<400> 12

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttgggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagataatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat

SEQUENCE LISTING.ST25.txt

840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta

SEQUENCE LISTING.ST25.txt

1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 13

<211> 1614

<212> DNA

<213> Pasteurella multocida

<400> 13

atcaatagag taccttttagt ttcaatttat atcccagctt ataactgtgc aaactatatt  
60

caacgttgcg tagatagtgc actgaatcag actgttgttg atctcgaggt ttgtatttgt  
120

aacgatggtt caacagataa taccttagaa gtgatcaata agctttatgg taataatcct  
180

agggtacgca tcatgtctaa accaaatggc ggaatagcct cagcatcaaa tgcagccggt  
240

tcttttgcta aaggttatta cattgggcag ttagattcag atgattatct tgagcctgat  
300

gcagttgaac tgtgttttaa agaattttta aaagataaaa cgctagcttg tgtttatacc

SEQUENCE LISTING.ST25.txt

360

actaatagaa acgtcaatcc ggatggtagc ttaatcgcta atgggttaciaa ttggccagaa  
420

ttttcacgag aaaaactcac aacggctatg attgctcacc actttagaat gttcacgatt  
480

agagcttggc atttaactga tggattcaat gaaaaaattg aaaatgccgt agactatgac  
540

atgttcctca aactcagtga agttggaaaa tttaaaccac ttaataaaat ctgctataac  
600

cgtgtattac atggtgataa cacatcaatt aagaaacttg gcattcaaaa gaaaaacccat  
660

tttgttgtag tcaatcagtc attaaataga caaggcataa cttattataa ttatgacgaa  
720

tttcatgatt tagatgaaag tagaaagtat attttcaata aaaccgctga atatcaagaa  
780

gagattgata tcttaaaaga tattaacatc atccagaata aagatgccaa aatcgcagtc  
840

agtatttttt atcccaatac attaaacggc ttagtgaaaa aactaaacaa tattattgaa  
900

tataataaaa atatattcgt tattgttcta catgttgata agaatcatct tacaccagat  
960

atcaaaaaag aaatactagc cttctatcat aaacatcaag tgaatatttt actaaataat  
1020

gatattctcat attacacgag taatagatta ataaaaactg aggcgcattt aagtaatatt  
1080

aataaattaa gtcagttaaa tctaaattgt gaatacatca tttttgataa tcatgacagc  
1140

ctattcgtta aaaatgacag ctatgcttat atgaaaaaat atgatgtcgg catgaatttc  
1200

tcagcattaa cacatgattg gatcgagaaa atcaatgcgc atccaccatt taaaaagctc  
1260

attaaaactt attttaatga caatgactta aaaagtatga atgtgaaagg ggcatcacaa



SEQUENCE LISTING.ST25.txt

1320

ggatatgttta tgacgtatgc gctagcgcat gagcttctga cgattattaa agaagtcac  
1380

acatcttgcc agtcaattga tagtgtgcca gaatataaca ctgaggatat ttggttccaa  
1440

tttgcacttt taatcttaga aaagaaaacc ggccatgtat ttaataaaac atcgaccctg  
1500

acttatatgc cttgggaacg aaaattacaa tggacaaatg aacaaattga aagtgcacaa  
1560

agaggagaaa atatacctgt taacaagttc attattaata gtataactct ataa  
1614

<210> 14

<211> 966

<212> DNA

<213> Pasteurella multocida

<400> 14

atcaatagag tacctttagt ttcaatttat atccagctt ataactgtgc aaactatatt  
60

caacgttgcg tagatagtgc actgaatcag actgttggtg atctcgaggt ttgtatttgt  
120

aacgatggtt caacagataa taccttagaa gtgatcaata agctttatgg taataatcct  
180

agggtacgca tcatgtctaa accaaatggc ggaatagcct cagcatcaaa tgcagccgtt  
240

tcttttgcta aaggttatta cattgggcag ttagattcag atgattatct tgagcctgat  
300

gcagttgaac tgtgttttaa agaattttta aaagataaaa cgctagcttg tgtttatacc  
360

actaatagaa acgtcaatcc ggatggtagc ttaatcgcta atgggttacia ttggccagaa

SEQUENCE LISTING.ST25.txt

420

ttttcacgag aaaaactcac aacggctatg attgctcacc actttagaat gttcacgatt  
480

agagcttggc atttaactga tggattcaat gaaaaaattg aaaatgccgt agactatgac  
540

atgttcctca aactcagtga agttggaaaa tttaaacatc ttaataaaat ctgctataac  
600

cgtgtattac atggtgataa cacatcaatt aagaaacttg gcattcaaaa gaaaaaccat  
660

tttgttgtag tcaatcagtc attaaataga caaggcataa cttattataa ttatgacgaa  
720

tttgatgatt tagatgaaag tagaaagtat attttcaata aaaccgctga atatcaagaa  
780

gagattgata tcttaaaaga tattaaaatc atccagaata aagatgccaa aatcgcagtc  
840

agtatttttt atcccaatac attaaacggc ttagtgaaaa aactaaacaa tattattgaa  
900

tataataaaa atatattcgt tattgttcta catgttgata agaatcatct tacaccagat  
960

atctaa  
966

<210> 15

<211> 1821

<212> DNA

<213> Pasteurella multocida

<400> 15

atgaaacctg aacatcaaca tgttggtctt tctattatcg ttacaacatt caatcgacca  
60

gcaattttat cgattacatt agcctgttta gtaaaccaaa aaacacatta cccgtttgaa

SEQUENCE LISTING.ST25.txt

120

gttatcgtga cagatgatgg tagtcaggaa gatctatcac cgatcattcg ccaatatgaa  
180

aataaattgg atattcgcta cgtcagacaa aaagataacg gttttcaagc cagtgccgct  
240

cggaatatgg gattacgctt agcaaaatat gactttattg gcttactcga ctgtgatatg  
300

gcgccaaatc cattatgggt tcattcttat gttgcagagc tattagaaga tgatgattta  
360

acaatcattg gtccaagaaa atacatcgat acacaacata ttgacccaaa agacttctta  
420

aataacgcga gtttgcttga atcattacca gaagtgaaaa ccaataatag tgttgccgca  
480

aaaggggaag gaacagtttc tctggattgg cgcttagaac aattcgaaaa aacagaaaat  
540

ctccgcttat ccgattcgcc tttccgtttt tttgcggcgg gtaatgttgc tttcgctaaa  
600

aaatggctaa ataaatccgg tttctttgat gaggaattta atcactgggg tggagaagat  
660

gtggaatttg gatatcgctt attccgttac ggtagtttct ttaaaactat tgatggcatt  
720

atggcctacc atcaagagcc accaggtaaa gaaaatgaaa ccgatcgtga agcgggaaaa  
780

aatattacgc tcgatattat gagagaaaag gtcccttata tctatagaaa acttttacca  
840

atagaagatt cgcatatcaa tagagtacct ttagtttcaa tttatatccc agcttataac  
900

tgtgcaaact atattcaacg ttgcgtagat agtgcactga atcagactgt tgttgatctc  
960

gaggtttgta tttgtaacga tggttcaaca gataatacct tagaagtgat caataagctt  
1020

tatggtaata atcctagggt acgcatcatg tctaaaccaa atggcggaat agcctcagca

SEQUENCE LISTING.ST25.txt

1080

tcaaattgcag ccgtttcttt tgctaaaggt tattacattg ggcagttaga ttcagatgat  
1140

tatcttgagc ctgatgcagt tgaactgtgt ttaaaagaat ttttaaaga taaaacgcta  
1200

gcttgtgttt ataccactaa tagaaacgtc aatccggatg gtagcttaat cgctaattgg  
1260

tacaattggc cagaattttc acgagaaaaa ctcacaacgg ctatgattgc tcaccacttt  
1320

agaatgttca cgattagagc ttggcattta actgatggat tcaatgaaaa aattgaaaat  
1380

gccgtagact atgacatggt cctcaaactc agtgaagttg gaaaatttaa acatcttaat  
1440

aaaatctgct ataaccgtgt attacatggg gataacacat caattaagaa acttggcatt  
1500

caaaagaaaa accattttgt tgtagtcaat cagtcattaa atagacaagg cataacttat  
1560

tataattatg acgaatttga tgatttagat gaaagtagaa agtatatttt caataaaacc  
1620

gctgaatatc aagaagagat tgatatctta aaagatatta aaatcatcca gaataaagat  
1680

gccaaaatcg cagtcagtat tttttatccc aatacattaa acggcttagt gaaaaaacta  
1740

aacaatatta ttgaatataa taaaaatata ttcgttattg ttctacatgt tgataagaat  
1800

catcttacac cagatatcta a  
1821

<210> 16

<211> 2112

<212> DNA

SEQUENCE LISTING.ST25.txt

<213> Pasteurella multocida

<400> 16

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcatagat ccggttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttgggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgaagg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca

SEQUENCE LISTING.ST25.txt

900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcaactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tgggtcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc

SEQUENCE LISTING.ST25.txt

1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggg  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 17

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 17

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca

SEQUENCE LISTING.ST25.txt

420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaaa aaacacatta cccgtttgaa gttatcgtga cagataaagg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat



SEQUENCE LISTING.ST25.txt

1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tgggtcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttggtgtt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgttc cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 18

<211> 2112

<212> DNA

SEQUENCE LISTING.ST25.txt

<213> Pasteurella multocida

<400> 18

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaa  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtagca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttgggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca

SEQUENCE LISTING.ST25.txt

900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcgggcg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgactga atcagactgt tgttgatctc gaggtttgta tttgtaacga aggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc

SEQUENCE LISTING.ST25.txt

1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 19

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 19

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca

SEQUENCE LISTING.ST25.txt

420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat

SEQUENCE LISTING.ST25.txt

1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacaa aggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggg  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 20

<211> 2271

<212> DNA

SEQUENCE LISTING.ST25.txt

<213> Pasteurella multocida

<400> 20

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca

SEQUENCE LISTING.ST25.txt

900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcaactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc



SEQUENCE LISTING.ST25.txt

1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatta aaatcatcca gaataaagat gccaaaatcg cagtcagtat tttttatccc  
2160

aatacattaa acggcttagt gaaaaaacta aacaatatta ttgaatataa taaaaatata  
2220

ttcgttattg ttctacatgt tgataagaat catcttacac cagatatcta a  
2271

<210> 21

<211> 1704

<212> DNA

<213> Pasteurella multocida

<400> 21

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccggttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg

SEQUENCE LISTING.ST25.txt

300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtaaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaacaaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag

SEQUENCE LISTING.ST25.txt

1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgta  
1680

aatccggatg gtagcttaat ctaa  
1704

<210> 22

<211> 18

<212> PRT

<213> artificial sequence

<220>

<223> synthetic peptide based on residues 526-543 of pmHAS

<400> 22

Leu	Asp	Ser	Asp	Asp	Tyr	Leu	Glu	Pro	Asp	Ala	Val	Glu	Leu	Cys	Leu
1				5					10					15	

Lys Glu

SEQUENCE LISTING.ST25.txt

<210> 23

<211> 24

<212> DNA

<213> Artificial sequence

<220>

<223> primer Pm10

<400> 23

cactgtctaa ctttattggt agcc

24

<210> 24

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> primer Pm21

<400> 24

tttttaacga ataggctgtc

20

<210> 25

<211> 19

<212> PRT

<213> artificial sequence

SEQUENCE LISTING.ST25.txt

<220>

<223> synthetic peptide based on residues 526 to 544 of pmHAS protein

<400> 25

Leu Asp Ser Asp Asp Tyr Leu Glu Pro Asp Ala Val Glu Leu Cys Leu  
1 5 10 15

Lys Glu Phe

<210> 26

<211> 2115

<212> DNA

<213> Pasteurella multocida

<400> 26

atgaatacat tatcacaagc aataaaagca tataacagca atgactatga attagcactc  
60

aaattatttg agaagtctgc tgaaacctac gggcgaaaaa tcgttgaatt ccaaattatc  
120

aaatgtaaag aaaaactctc gaccaattct tatgtaagtg aagataaaaa aaacagtgtt  
180

tgcgatagct cattagatat cgcaacacag ctcttacttt ccaacgtaaa aaaattaact  
240

ctatccgaat cagaaaaaaaa cagtttataaa aataaatgga aatctatcac tgggaaaaaa  
300

tcggagaacg cagaaatcag aaagggtggaa ctagtaccba aagattttcc taaagatctt  
360

gttcttgctc cattgccaga tcatgttaat gattttacat ggtacaaaaa tcgaaaaaaa

SEQUENCE LISTING.ST25.txt

420

agcttaggta taaagcctgt aaataagaat atcgggtcttt ctattattat tcctacattt  
480

aatcgtagcc gtattttaga tataacgtta gcctgttttg tcaatcagaa aacaaactac  
540

ccatttgaag tcgttggtgc agatgatggg agtaaggaaa acttacttac cattgtgcaa  
600

aaatacgaac aaaaacttga cataaagtat gtaagacaaa aagattatgg atatcaattg  
660

tgtgcagtca gaaacttagg tttacgtaca gcaaagtatg attttgtctc gattctagac  
720

tgcgatatgg caccacaaca attatggggt cattcttctc ttacagaact attagaagac  
780

aatgatattg ttttaattgg acctagaaaa tatgtggata ctcataatat taccgcagaa  
840

caattcctta acgatccata tttaatagaa tcactacctg aaaccgctac aaataacaat  
900

ccttcgatta catcaaaagg aaatatatcg ttggattgga gattagaaca tttcaaaaaa  
960

accgataatc tacgtctatg tgattctccg tttcggttatt ttagttgcgg taatgttgca  
1020

ttttctaaag aatggctaaa taaagtaggt tggttcgatg aagaatttaa tcattggggg  
1080

ggcgaagatg tagaatttgg ttacagatta ttgccaaag gctgtttttt cagagtaatt  
1140

gacggcggaa tggcatacca tcaagaacca cctggtaaag aaaatgaaac agaccgcgaa  
1200

gctggtaaaa gtattacgct taaaattgtg aaagaaaagg taccttacat ctatagaaag  
1260

cttttaccaa tagaagattc acatattcat agaatacctt tagtttctat ttatatcccc  
1320

gcttataact gtgcaaatta tattcaaaga tgtgtagata gtgctcttaa tcaaactgtt

SEQUENCE LISTING.ST25.txt

1380

gtcgatctcg aggtttgtat ttgtaacgat ggttcaacag ataatacctt agaagtgatc  
1440

aataagcttt atggtaataa tcctagggtta cgcacatgt ctaaaccaaa tggcggaata  
1500

gcctcagcat caaatgcagc cgtttctttt gctaaagggtt attacattgg gcagttagat  
1560

tcagatgatt atcttgagcc tgatgcagtt gaactgtgtt taaaagaatt tttaaagat  
1620

aaaacgctag cttgtgttta taccactaat agaaacgtca atccggatgg tagcttaatc  
1680

gctaattggtt acaattggcc agaattttca cgagaaaaac tcacaacggc tatgattgct  
1740

caccatttta gaatgtttac gattagagct tggcatttaa cggatggatt taacgaaaat  
1800

attgaaaacg ccgtggatta tgacatgttc cttaaactca gtgaagttgg aaaatttaaa  
1860

catcttaata aaatctgcta taaccgcgta ttacatgggtg ataacacatc cattaagaaa  
1920

ctcggcattc aaaagaaaaa ccattttgtt gtagtcaatc agtcattaaa tagacaaggc  
1980

atcaattatt ataattatga caaatttgat gatttagatg aaagtagaaa gtatatcttc  
2040

aataaaaccg ctgaatatca agaagaaatg gatattttta aagatcttaa actcattcaa  
2100

aataaagatg cctaa  
2115

<210> 27

<211> 1980

<212> DNA

SEQUENCE LISTING.ST25.txt

<213> Pasteurella multocida

<400> 27

atgctctcag cacatccttc tggttaattca gcacatcttt ctgtaaataa agaagaaaaa  
60

gtcaatgttt gcgatagtcc gttagatatt gcaacacaac tggtactttc caacgtaaaa  
120

aaattagtagt tttctgactc ggaaaaaaac acgttaaaaa ataaatggaa attgctcact  
180

gagaagaaat ctgaaaatgc ggaggtaaga gcggtcgccc ttgtaccaa agattttccc  
240

aaagatctgg ttttagcgcc ttacctgat catgttaatg attttacatg gtacaaaaag  
300

cgaaagaaaa gacttggcat aaaacctgaa catcaacatg ttggtctttc tattatcggt  
360

acaacattca atcgaccagc aattttatcg attacattag cctgttttagt aaaccaaaaa  
420

acacattacc cgtttgaagt tatcgtgaca gatgatggta gtcaggaaga tctatcacccg  
480

atcattcgcc aatatgaaaa taaattggat attcgctacg tcagacaaaa agataacggt  
540

tttcaagcca gtgccgctcg gaatatggga ttacgcttag caaaatatga ctttattggc  
600

ttactcgact gtgatatggc gccaaatcca ttatgggttc attccttatgt tgcagagcta  
660

ttagaagatg atgatttaac aatcattggt ccaagaaaat acatcgatac acaacatatt  
720

gacccaaaag acttcttaaa taacgcgagt ttgcttgaat cattaccaga agtgaaaacc  
780

aataatagtg ttgccgcaaa aggggaagga acagtttctc tggattggcg cttagaacia  
840

ttcgaaaaaa cagaaaatct ccgcttatcc gattcgccctt tccgtttttt tgcggcgggg



SEQUENCE LISTING.ST25.txt

900

aatgttgctt tcgctaaaaa atggctaaat aaatccggtt tctttgatga ggaatttaat  
960

cactggggtg gagaagatgt ggaatttgga tatcgcttat tccgttacgg tagtttcttt  
1020

aaaactattg atggcattat ggcctaccat caagagccac caggtaaaga aaatgaaacc  
1080

gatcgtgaag cgggaaaaaa tattacgctc gatattatga gagaaaaggc cccttatatc  
1140

tatagaaaac ttttaccaat agaagattcg catatcaata gaggaccttt agtttcaatt  
1200

tatatcccag cttataactg tgcaaactat attcaacggt gcgtagatag tgcactgaat  
1260

cagactgttg ttgatctcga ggtttgtatt tgtaacgatg gttcaacaga taatacctta  
1320

gaagtgatca ataagcttta tggttaataat cctaggggtac gcatcatgtc taaaccaa  
1380

ggcgggaatag cctcagcatc aaatgcagcc gtttcttttg ctaaagggtta ttacattggg  
1440

cagttagatt cagatgatta tcttgagcct gatgcagttg aactgtgttt aaaagaattt  
1500

ttaaaagata aaacgctagc ttgtgtttat accactaata gaaacgtcaa tccggatggg  
1560

agcttaatcg ctaatgggta caattggcca gaattttcac gagaaaaact cacaacggct  
1620

atgattgctc accactttag aatgttcacg attagagctt ggcatttaac tgatggattc  
1680

aatgaaaaaa ttgaaaatgc cgtagactat gacatgttcc tcaaactcag tgaagttgga  
1740

aaatttaaac atcttaataa aatctgctat aaccgtgtat tacatgggtga taacacatca  
1800

attaagaaac ttggcattca aaagaaaaac cattttgttg tagtcaatca gtcattaaat

SEQUENCE LISTING.ST25.txt

1860

agacaaggca taacttatta taattatgac gaatttgatg atttagatga aagtagaaag  
1920

tatattttca ataaaaccgc tgaatatcaa gaagagattg atatcttaaa agatatttaa  
1980

<210> 28

<211> 1902

<212> DNA

<213> Pasteurella multocida

<400> 28

atggttagata ttgcaacaca actggttactt tccaacgtaa aaaaattagt actttctgac  
60

tcggaaaaaa acacgttaaa aaataaatgg aaattgctca ctgagaagaa atctgaaaat  
120

gcggaggtaa gagcggtcgc ccttgtagca aaagattttc ccaaagatct gggttttagcg  
180

cctttacctg atcatgttaa tgattttaca tggtagaaaa agcgaaagaa aagacttggc  
240

ataaaacctg aacatcaaca tggttggtctt tctattatcg ttacaacatt caatcgacca  
300

gcaattttat cgattacatt agcctgttta gtaaaccaaa aaacacatta cccgtttgaa  
360

gttatcgtga cagatgatgg tagtcaggaa gatctatcac cgatcattcg ccaatatgaa  
420

aataaattgg atattcgcta cgtcagacaa aaagataacg gttttcaagc cagtgccgct  
480

cggaatatgg gattacgctt agcaaaatat gactttattg gcttactcga ctgtgatatg  
540

gcgccaaatc cattatgggt tcattcttat gttgcagagc tattagaaga tgatgattta

SEQUENCE LISTING.ST25.txt

600

acaatcattg gtccaagaaa atacatcgat acacaacata ttgacccaaa agacttctta  
660

aataacgcga gtttgcttga atcattacca gaagtgaaaa ccaataatag tgttgccgca  
720

aaaggggaag gaacagtttc tctggattgg cgcttagaac aattcgaaaa aacagaaaat  
780

ctccgcttat ccgattcgcc ttcccgtttt ttgcggcgg gtaatgttgc ttccgctaaa  
840

aaatggctaa ataaatccgg tttctttgat gaggaattta atcactgggg tggagaagat  
900

gtggaatttg gatatcgctt attccgttac ggtagtttct ttaaaactat tgatggcatt  
960

atggcctacc atcaagagcc accaggtaaa gaaaatgaaa ccgatcgtga agcgggaaaa  
1020

aatattacgc tcgatattat gagagaaaag gtcccttata tctatagaaa acttttacca  
1080

atagaagatt cgcatatcaa tagagtacct ttagtttcaa tttatatccc agcttataac  
1140

tgtgcaaact atattcaacg ttgcgtagat agtgcactga atcagactgt tgttgatctc  
1200

gaggtttgta tttgtaacga tggttcaaca gataatacct tagaagtgat caataagctt  
1260

tatggtaata atcctagggt acgcatcatg tctaaaccaa atggcggaat agcctcagca  
1320

tcaaatgcag ccgtttcttt tgctaaagggt tattacattg ggcagttaga ttcagatgat  
1380

tatcttgagc ctgatgcagt tgaactgtgt ttaaaagaat ttttaaaga taaaacgcta  
1440

gcttggttt ataccactaa tagaaacgtc aatccggatg gtagcttaat cgctaattgg  
1500

tacaattggc cagaattttc acgagaaaaa ctcaaacgg ctatgattgc tcaccacttt

SEQUENCE LISTING.ST25.txt

1560

agaatgttca cgattagagc ttggcattta actgatggat tcaatgaaaa aattgaaaat  
1620

gccgtagact atgacatggt cctcaaactc agtgaagttg gaaaatttaa acatcttaat  
1680

aaaatctgct ataaccgtgt attacatggt gataacacat caattaagaa acttggcatt  
1740

caaaagaaaa accatthttgt tgtagtcaat cagtcattaa atagacaagg cataacttat  
1800

tataattatg acgaatttga tgatttagat gaaagtagaa agtatatttt caataaaacc  
1860

gctgaatatc aagaagagat tgatatctta aaagatatth aa  
1902

<210> 29

<211> 1830

<212> DNA

<213> Pasteurella multocida

<400> 29

atgttaaaaa ataatggaa attgctcact gagaagaaat ctgaaaatgc ggaggtaaga  
60

gcggtcgccc ttgtaccaa agatthttccc aaagatctgg tthtagcgcc tttacctgat  
120

catgttaatg atthttacatg gtacaaaaag cgaaagaaaa gacttggcat aaaacctgaa  
180

catcaacatg ttggtctthc tattatcgtht acaacattca atcgaccagc aatthttatcg  
240

attacattag cctgtthtagt aaaccaaaaa acacattacc cgthttgaagt tatcgthgaca  
300

gatgatggta gtcaggaaga tctatcaccg atcattcgcc aatatgaaaa taaattggat

SEQUENCE LISTING.ST25.txt

360

attcgctacg tcagacaaaa agataacggt tttcaagcca gtgccgctcg gaatatggga  
420

ttacgcttag caaaatatga ctttattggc ttactcgact gtgatatggc gccaaatcca  
480

ttatgggttc attcttatgt tgcagagcta ttagaagatg atgatttaac aatcattggt  
540

ccaagaaaat acatcgatac acaacatatt gacccaaaag acttcttaaa taacgcgagt  
600

ttgcttgaat cattaccaga agtgaaaacc aataatagtg ttgccgcaaa aggggaagga  
660

acagtttctc tggattggcg cttagaacaa ttcgaaaaaa cagaaaatct ccgcttatcc  
720

gattcgctt tccgtttttt tgcggcgggt aatgttgctt tcgctaaaaa atggctaaat  
780

aaatccggtt tctttgatga ggaatttaat cactgggggtg gagaagatgt ggaatttgga  
840

tatcgcttat tccgttacgg tagtttcttt aaaactattg atggcattat ggcctaccat  
900

caagagccac caggtaaaga aaatgaaacc gatcgtgaag cgggaaaaaa tattacgctc  
960

gatattatga gagaaaaggt cccttatatc tatagaaaac ttttaccaat agaagattcg  
1020

catatcaata gaggaccttt agtttcaatt tatatcccag cttataactg tgcaaactat  
1080

attcaacggt gcgtagatag tgcactgaat cagactgttg ttgatctoga ggtttgtatt  
1140

tgtaacgatg gttcaacaga taatacctta gaagtgatca ataagcttta tggtataaat  
1200

cctagggtag gcatcatgtc taaaccaaat ggcggaatag cctcagcatc aaatgcagcc  
1260

gtttcttttg ctaaaggtta ttacattggg cagtttagatt cagatgatta tcttgagcct

SEQUENCE LISTING.ST25.txt

1320

gatgcagttg aactgtgttt aaaagaattt ttaaaagata aaacgctagc ttgtgtttat  
1380

accactaata gaaacgtcaa tccggatggt agcttaatcg ctaatgggta caattggcca  
1440

gaattttcac gagaaaaact cacaacggct atgattgctc accactttag aatgttcacg  
1500

attagagctt ggcatttaac tgatggattc aatgaaaaaa ttgaaaatgc cgtagactat  
1560

gacatgttcc tcaaactcag tgaagttgga aaatttaaac atcttaataa aatctgctat  
1620

aaccgtgtat tacatgggtga taacacatca attaagaaac ttggcattca aaagaaaaac  
1680

cattttgttg tagtcaatca gtcattaaat agacaaggca taacttatta taattatgac  
1740

gaatttgatg atttagatga aagtagaaag tatattttca ataaaaccgc tgaatatcaa  
1800

gaagagattg atatcttaaa agatatttaa  
1830

<210> 30

<211> 1764

<212> DNA

<213> Pasteurella multocida

<400> 30

atgcttgtag caaaagattt tcccaaagat ctggtttttag cgcctttacc tgatcatggt  
60

aatgatttta catggtacaa aaagcgaaag aaaagacttg gcataaaacc tgaacatcaa  
120

catgttggtc tttctattat cgttacaaca ttcaatcgac cagcaatttt atcgattaca

SEQUENCE LISTING.ST25.txt

180

ttagcctggt tagtaaacca aaaaacacat taccggttg aagttatcgt gacagatgat  
240

ggtagtcagg aagatctatc accgatcatt cgccaatatg aaaataaatt ggatattcgc  
300

tacgtcagac aaaaagataa cggttttcaa gccagtgccg ctcggaatat gggattacgc  
360

ttagcaaaat atgactttat tggcttactc gactgtgata tggcgccaaa tccattatgg  
420

gttcattctt atgttgcaga gctattagaa gatgatgatt taacaatcat tggccaaga  
480

aaatacatcg atacacaaca tattgacca aaagacttct taaataacgc gagtttgctt  
540

gaatcattac cagaagtga aaccaataat agtggtgccg caaaagggga aggaacagtt  
600

tctctggatt ggcgcttaga acaattcgaa aaaacagaaa atctccgctt atccgattcg  
660

cctttccggt tttttgcggc gggtaatgtt gctttcgcta aaaaatggct aaataaatcc  
720

ggtttctttg atgaggaatt taatcactgg ggtggagaag atgtggaatt tggatatcgc  
780

ttattccggt acggtagttt ctttaaaact attgatggca ttatggccta ccatcaagag  
840

ccaccaggta aagaaaatga aaccgatcgt gaagcgggaa aaaatattac gctcgatatt  
900

atgagagaaa aggtccctta tatctataga aaacttttac caatagaaga ttcgcatatc  
960

aatagagtac ctttagtttc aatttatatc ccagcttata actgtgcaaa ctatattcaa  
1020

cgttgcgtag atagtgcact gaatcagact gttgttgatc tcgaggtttg tatttgtaac  
1080

gatggttcaa cagataatac cttagaagtg atcaataagc tttatggtaa taatcctagg

SEQUENCE LISTING.ST25.txt

1140

gtacgcatca tgtctaaacc aaatggcgga atagcctcag catcaaatgc agccgtttct  
1200

tttgctaaag gttattacat tgggcagtta gattcagatg attatcttga gcctgatgca  
1260

gttgaactgt gtttaaaaga atttttaaaa gataaaacgc tagcttgtgt ttataccact  
1320

aatagaaaacg tcaatccgga tggtagctta atcgctaag gttacaattg gccagaattt  
1380

tcacgagaaa aactcacaac ggctatgatt gctcaccact ttagaatggt cacgattaga  
1440

gcttggcatt taactgatgg attcaatgaa aaaattgaaa atgccgtaga ctatgacatg  
1500

ttcctcaaac tcagtgaagt tggaaaattt aaacatctta ataaaatctg ctataaccgt  
1560

gtattacatg gtgataaac atcaattaag aaacttggca ttcaaaagaa aaaccatttt  
1620

gttgtagtca atcagtcatt aaatagacaa ggcataactt attataatta tgacgaattt  
1680

gatgatttag atgaaagtag aaagtatatt ttcaataaaa ccgctgaata tcaagaagag  
1740

attgatattt taaaagatat ttaa  
1764

<210> 31

<211> 2007

<212> DNA

<213> Pasteurella multocida

<400> 31

atgaatacat tatcacaagc aataaaaagca tataacagca atgactatca attagcactc



SEQUENCE LISTING.ST25.txt

60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtcct  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaagggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt

SEQUENCE LISTING.ST25.txt

1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatcggg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggg acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggg  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat

SEQUENCE LISTING.ST25.txt

1980

cagtcattaa atagacaagg catataa

2007

<210> 32

<211> 2061

<212> DNA

<213> Pasteurella multocida

<400> 32

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccggttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa

SEQUENCE LISTING.ST25.txt

660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggg acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt

SEQUENCE LISTING.ST25.txt

1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccgatg gtagcttaat cgctaattggc tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatattta a  
2061

<210> 33

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 33

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt

SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga atgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcgggcg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa

SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa

SEQUENCE LISTING.ST25.txt

2112

<210> 34

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 34

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttgggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat



SEQUENCE LISTING.ST25.txt

720

gactttattg gcttactcaa ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggg acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttggtgtt ataccactaa tagaaacgtc

SEQUENCE LISTING.ST25.txt

1680

aatccggatg gtagcttaat cgctaattggt tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 35

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 35

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcatagat ccgtagata ttgcaacaca actgttactt

SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcaa atgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aatgggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa

SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tgggtcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa

SEQUENCE LISTING.ST25.txt

2112

<210> 36

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 36

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatattg aaaagtcggc ggaaatctat ggacggaaaa ttggtgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa agtcaatgt ttgcgatagt ccggttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat

SEQUENCE LISTING.ST25.txt

720

gactttattg gcttactcga ctgtgaaatg gcgccaaatc cattatgggt tcattcttat  
780

gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc

SEQUENCE LISTING.ST25.txt

1680

aatccggatg gtagcttaat cgctaattggt tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatat aa  
2112

<210> 37

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 37

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt

SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtaatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa



SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcaactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttggtgttt ataccactaa tagaaacgct  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa

SEQUENCE LISTING.ST25.txt

2112

<210> 38

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 38

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcatagat ccgtagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat

SEQUENCE LISTING.ST25.txt

720

gactttattg gcttactcga ctgtaaaatg gcgccaaatc cattatgggt tcattcttat  
780

gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggg acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagcag ccgtttcttt tgctaaagggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttggtgtt ataccactaa tagaaacgtc

SEQUENCE LISTING.ST25.txt

1680

aatccggatg gtagcttaat cgctaattggt tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 39

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 39

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt

SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa

SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatacgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcaactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatacag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaaa ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa

SEQUENCE LISTING.ST25.txt

2112

<210> 40

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 40

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatattg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggttaa gagcggctgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat

SEQUENCE LISTING.ST25.txt

720

gaactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgccggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga atcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc



SEQUENCE LISTING.ST25.txt

1680

aatccggatg gtagcttaat cgctaattggt tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 41

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 41

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt

SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgaccctaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa

SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaaa atcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttggtgtt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa

SEQUENCE LISTING.ST25.txt

2112

<210> 42

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 42

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtcct  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat

SEQUENCE LISTING.ST25.txt

720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgccggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcagaagat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc

SEQUENCE LISTING.ST25.txt

1680

aatccggatg gtagcttaat cgctaattggt tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 43

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 43

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt

SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaagatct ggttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa

SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcaaagat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa



SEQUENCE LISTING.ST25.txt

2112

<210> 44

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 44

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatattg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaacccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat

SEQUENCE LISTING.ST25.txt

720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat.  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggg acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagtcag ccgtttcttt tgctaaagggt  
1560

tattacattg ggcagttaga ttcaaaagat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc

SEQUENCE LISTING.ST25.txt

1680

aatccggatg gtagcttaat cgctaattggt tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 45

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 45

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcatagat ccgtagata ttgcaacaca actgttactt

SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagacgat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa

SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa

SEQUENCE LISTING.ST25.txt

2112

<210> 46

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 46

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatattg aaaagtcggc ggaaatctat ggacggaaaa ttggtgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccggttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggttaa gagcggctgc ccttgtacca  
360

aaagattttc ccaaagatct ggttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat

SEQUENCE LISTING.ST25.txt

720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcgggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggacaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagcag ccgtttcttt tgctaaagggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc

SEQUENCE LISTING.ST25.txt

1680

aatccggatg gtagcttaat cgctaattggt tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgttc cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 47

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 47

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcatagat ccggttagata ttgcaacaca actgttactt



SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggttaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttgggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgaccctaaa agactttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggacacgat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa

SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa

SEQUENCE LISTING.ST25.txt

2112

<210> 48

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 48

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatattg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccggttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtcct  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat

SEQUENCE LISTING.ST25.txt

720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcaagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagaa gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggg acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagtcag ccgtttcttt tgctaaagggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttggtgtt ataccactaa tagaaacgtc

SEQUENCE LISTING.ST25.txt

1680

aatccggatg gtagcttaat cgctaattggt tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 49

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 49

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt

SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggttaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaaaat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa

SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tgggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaatgcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaatgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa

SEQUENCE LISTING.ST25.txt

2112

<210> 50

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 50

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcatagat ccggttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggctct  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat



SEQUENCE LISTING.ST25.txt

720

gacttttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgacagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcgggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaaaaa gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggg acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagcag ccgtttcttt tgctaaagggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc

SEQUENCE LISTING.ST25.txt

1680

aatccggatg gtagcttaat cgctaattggg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgtca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggt  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat  
2040

gaaagtagaa agtatatttt caataaaacc gctgaatatc aagaagagat tgatatctta  
2100

aaagatatatt aa  
2112

<210> 51

<211> 2136

<212> DNA

<213> Pasteurella multocida

<400> 51

atgaacacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc  
60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgccaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgtagata ttgcaacaca actgttactt

SEQUENCE LISTING.ST25.txt

240

tccaacgtaa aaaaattagt acttttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggttaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtctt  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat  
780

gttgcagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agactttcta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaaggggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt  
1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccggttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa

SEQUENCE LISTING.ST25.txt

1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag  
1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcattattca tagaatacct  
1320

ttagttttcta tttatatccc cgcttataac tgtgcaaatt atattcaaag atgtgtagat  
1380

agtgctctta atcaaactgt tgtcgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaattgcag ccgtttcttt tgctaaagg  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccatttt agaattgtta cgattagagc ttggcattta  
1800

acggatggat ttaacgaaaa tattgaaaac gccgtggatt atgacatggt ccttaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgcgt attacatggt  
1920

gataacacat ccattaagaa actcggcatt caaaagaaaa accattttgt tgtagtcaat  
1980

cagtcattaa atagacaagg catcaattat tataattatg acaaatttga tgatttagat  
2040

gaaagtagaa agtatatctt caataaaacc gctgaatatc aagaagaaat ggatatttta  
2100

aaagatctta aactcattca gaataaagat gcctaa

SEQUENCE LISTING.ST25.txt

2136

<210> 52

<211> 2091

<212> DNA

<213> Pasteurella multocida

<400> 52

atgaatacat tatcacaagc aataaaagca tataacagca atgactatga attagcactc  
60

aaattatttg agaagtctgc tgaaacctac gggcgaaaaa tcgttgaatt ccaaattatc  
120

aaatgtaaag aaaaactctc gaccaattct tatgtaagtg aagataaaaa aaacagtgtt  
180

tgcgatagct cattagatat cgcaacacag ctcttacttt ccaacgtaaa aaaattaact  
240

ctatccgaat cagaaaaaaaa cagtttataaa aataaatgga aatctatcac tgggaaaaaa  
300

tcggagaacg cagaaatcag aaaggtggaa ctagtaccca aagattttcc taaagatctt  
360

gttcttgctc cattgccaga tcatgttaat gattttacat ggtacaaaaa tcgaaaaaaa  
420

agcttaggta taaagcctgt aaataagaat atcgggtcttt ctattattat tcctacattt  
480

aatcgtagcc gtatttttaga tataacgtta gcctgtttgg tcaatcagaa aacaaactac  
540

ccatttgaag tcgttgttgc agatgatggg agtaaggaaa acttacttac cattgtgcaa  
600

aaatacgaac aaaaacttga cataaagtat gtaagacaaa aagattatgg atatcaattg  
660

tgtgcagtca gaaacttagg ttacgtaca gcaaagtatg attttgtctc gattctagac

SEQUENCE LISTING.ST25.txt

720

tgcgatatgg caccacaaca attatgggtt cattcttatt ttacagaact attagaagac  
780

aatgatattg ttttaattgg acctagaaaa tatgtggata ctcataatat taccgcagaa  
840

caattcctta acgatccata tttaatagaa tcactacctg aaaccgctac aaataacaat  
900

ccttcgatta catcaaaagg aaatatatcg ttggattgga gattagaaca tttcaaaaaa  
960

accgataatc tacgtctatg tgattcacgg tttcggtatt ttagttgcgg taatgttgca  
1020

ttttctaaag aatggctaaa taaagtaggt tggttcgatg aagaatttaa tcattggggg  
1080

ggcgaagatg tagaatttgg ttacagatta ttgccaaag gctgtttttt cagagtaatt  
1140

gacggcggaa tggcatacca tcaagaacca cctggtaaag aaaatgaaac agaccgcgaa  
1200

gctggtaaaa gtattacgct taaaattgtg aaagaaaagg taccttacat ctatagaaaa  
1260

cttttaccaa tagaagattc gcatatcaat agagtacctt tagtttcaat ttatatccca  
1320

gcttataact gtgcaaacta tattcaacgt tgcgtagata gtgcactgaa tcagactgtt  
1380

gttgatctcg aggtttgtat ttgtaacgat ggttcaacag ataatacctt agaagtgatc  
1440

aataagcttt atggtaataa tcctagggtg cgcacatgtg ctaaaccaaa tggcggaata  
1500

gcctcagcat caaatgcagc cgtttctttt gctaaagggtt attacattgg gcagttagat  
1560

tcagatgatt atcttgagcc tgatgcagtt gaactgtgtt taaaagaatt tttaaaagat  
1620

aaaacgctag cttgtgttta taccactaat agaaacgtca atccggatgg tagcttaatc

SEQUENCE LISTING.ST25.txt

1680

gctaattggtt acaattggcc agaattttca cgagaaaaac tcacaacggc tatgattgct  
1740

caccacttta gaatgttcac gattagagct tggcatttaa ctgatggatt caatgaaaaa  
1800

attgaaaatg ccgtagacta tgacatgttc ctcaaactca gtgaagttgg aaaatttaaa  
1860

catcttaata aaatctgcta taaccgtgta ttacatgggtg ataacacatc aattaagaaa  
1920

cttggcattc aaaagaaaaa ccattttgtt gtagtcaatc agtcattaaa tagacaaggc  
1980

ataacttatt ataattatga cgaatttgat gatttagatg aaagtagaaa gtatatatttc  
2040

aataaaaccg ctgaatatca agaagagatt gatatcttaa aagatattta a  
2091

<210> 53

<211> 29

<212> DNA

<213> artificial sequence

<220>

<223> primer P1

<400> 53  
atgaacacat tatcacaagc aataaaagc  
29

<210> 54

<211> 27

<212> DNA

SEQUENCE LISTING.ST25.txt

<213> artificial sequence

<220>

<223> primer P2

<220>

<221> misc\_feature

<222> (23)..(23)

<223> Y = C/T

<400> 54  
gcgaatcttc tattggtaaa agytttc  
27

<210> 55

<211> 26

<212> DNA

<213> artificial sequence

<220>

<223> primer P3

<400> 55  
cttttaccaa tagaagattc gcatat  
26

<210> 56

<211> 33

<212> DNA



SEQUENCE LISTING.ST25.txt

<213> artificial sequence

<220>

<223> primer P4

<400> 56  
gaagacgtct taggcatctt tattctgaat gag  
33

<210> 57

<211> 43

<212> DNA

<213> artificial sequence

<220>

<223> primer P5

<400> 57  
gggaattctg cagttaaata tcttttaaga tatcaatctc ttc  
43

<210> 58

<211> 33

<212> DNA

<213> artificial sequence

<220>

<223> sense primer

<220>

SEQUENCE LISTING.ST25.txt

<221> misc\_feature

<222> (9)..(9)

<223> inosine

<220>

<221> misc\_feature

<222> (12)..(12)

<223> inosine

<220>

<221> misc\_feature

<222> (18)..(18)

<223> inosine

<220>

<221> misc\_feature

<222> (24)..(24)

<223> inosine

<220>

<221> misc\_feature

<222> (27)..(27)

<223> inosine

SEQUENCE LISTING.ST25.txt

<400> 58  
garttybtnm rngarggnaa rgcnnytntay gay  
33

<210> 59

<211> 39

<212> DNA

<213> artificial sequence

<220>

<223> antisense primer

<220>

<221> misc\_feature

<222> (7)..(7)

<223> inosine

<220>

<221> misc\_feature

<222> (10)..(10)

<223> inosine

<220>

<221> misc\_feature

<222> (16)..(16)

<223> inosine

SEQUENCE LISTING.ST25.txt

<220>

<221> misc\_feature

<222> (22)..(22)

<223> inosine

<220>

<221> misc\_feature

<222> (25)..(25)

<223> A, G, C or T

<400> 59

rcartanccn ccartanccra answnnggrtt rttrtartg  
39

<210> 60

<211> 30

<212> DNA

<213> artificial sequence

<220>

<223> 2nd antisense primer

<400> 60

tatatttaca gcagtatcat tttctaaagg  
30

<210> 61

SEQUENCE LISTING.ST25.txt

<211> 501

<212> PRT

<213> Pasteurella multocida

<400> 61

Met Ser Leu Phe Lys Arg Ala Thr Glu Leu Phe Lys Ser Gly Asn Tyr  
1 5 10 15

Lys Asp Ala Leu Thr Leu Tyr Glu Asn Ile Ala Lys Ile Tyr Gly Ser  
20 25 30

Glu Ser Leu Val Lys Tyr Asn Ile Asp Ile Cys Lys Lys Asn Ile Thr  
35 40 45

Gln Ser Lys Ser Asn Lys Ile Glu Glu Asp Asn Ile Ser Gly Glu Asn  
50 55 60

Glu Phe Ser Val Ser Ile Lys Asp Leu Tyr Asn Glu Ile Ser Asn Ser  
65 70 75 80

Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser  
85 90 95

Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile  
100 105 110

Asn Ser Leu Leu Leu Gln Thr Tyr Asn Asn Leu Glu Val Ile Val Val  
115 120 125

Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala  
130 135 140

Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly  
145 150 155 160

SEQUENCE LISTING.ST25.txt

Thr	Tyr	Phe	Ala	Lys	Asn	Thr	Gly	Ile	Leu	Lys	Ser	Lys	Gly	Asp	Ile		
				165					170					175			
Ile	Phe	Phe	Gln	Asp	Ser	Asp	Asp	Val	Cys	His	His	Glu	Arg	Ile	Glu		
			180					185					190				
Arg	Cys	Val	Asn	Ala	Leu	Leu	Ser	Asn	Lys	Asp	Asn	Ile	Ala	Val	Arg		
		195					200					205					
Cys	Ala	Tyr	Ser	Arg	Ile	Asn	Leu	Glu	Thr	Gln	Asn	Ile	Ile	Lys	Val		
	210					215					220						
Asn	Asp	Asn	Lys	Tyr	Lys	Leu	Gly	Leu	Ile	Thr	Leu	Gly	Val	Tyr	Arg		
225					230					235					240		
Lys	Val	Phe	Asn	Glu	Ile	Gly	Phe	Phe	Asn	Cys	Thr	Thr	Lys	Ala	Ser		
				245					250					255			
Asp	Asp	Glu	Phe	Tyr	His	Arg	Ile	Ile	Lys	Tyr	Tyr	Gly	Lys	Asn	Arg		
			260					265					270				
Ile	Asn	Asn	Leu	Phe	Leu	Pro	Leu	Tyr	Tyr	Asn	Thr	Met	Arg	Glu	Asp		
		275					280					285					
Ser	Leu	Phe	Ser	Asp	Met	Val	Glu	Trp	Val	Asp	Glu	Asn	Asn	Ile	Lys		
	290					295					300						
Gln	Lys	Thr	Ser	Asp	Ala	Arg	Gln	Asn	Tyr	Leu	His	Glu	Phe	Gln	Lys		
305					310					315					320		
Ile	His	Asn	Glu	Arg	Lys	Phe	Asn	Glu	Leu	Lys	Glu	Ile	Phe	Ser	Phe		
			325						330					335			
Pro	Arg	Ile	His	Asp	Ala	Leu	Pro	Ile	Ser	Lys	Glu	Met	Ser	Lys	Leu		
			340					345					350				

SEQUENCE LISTING.ST25.txt

Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser  
355 360 365

Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys  
370 375 380

Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe  
385 390 395 400

Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys  
405 410 415

Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu  
420 425 430

Ile Lys Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Asp Ile  
435 440 445

Arg Tyr Pro Ala Asp Tyr Ile Asn Thr Met Ile Lys Lys Ile Asn Lys  
450 455 460

Tyr Asn Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser  
465 470 475 480

Arg Val Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val Tyr Asn Phe Gln  
485 490 495

Lys Thr Phe Arg Lys  
500

<210> 62

<211> 1510

<212> DNA

SEQUENCE LISTING.ST25.txt

<213> Pasteurella multocida

<400> 62

aatgagctta tttaaactg ctactgagct atttaagtca ggaaactata aagatgcact  
60

aactctatat gaaaatatag ctaaaattta tggttcagaa agccttggtta aatataatat  
120

tgatatatgt aaaaaaata taacacaatc aaaaagtaat aaaatagaag aagataatat  
180

ttctggagaa aacgaatttt cagtatcaat aaaagatcta tataacgaaa taagcaatag  
240

tgaattaggg attacaaaag aaagactagg agccccccct ctagtcagta ttataatgac  
300

ttctcataat acagaaaaat tcattgaagc ctcaattaat tcactattat tgcaaacata  
360

caataactta gaagttatcg ttgtagatga ttatagcaca gataaaacat ttcagatcgc  
420

atccagaata gcaaactcta caagtaaagt aaaaacattc cgattaaact caaatctagg  
480

gacatacttt gcgaaaaata caggaatttt aaagtctaaa ggagatatta ttttctttca  
540

ggatagcgat gatgtatgtc accatgaaag aatcgaaaga tgtgttaatg cattattatc  
600

gaataaagat aatatagctg ttagatgtgc atattctaga ataaatctag aaacacaaaa  
660

tataataaaa gttaatgata ataaatacaa attaggatta ataactttag gcgtttatag  
720

aaaagtattt aatgaaattg gtttttttaa ctgcacaacc aaagcatcgg atgatgaatt  
780

ttatcataga ataattaaat actatggtaa aaataggata aataacttat ttctaccact  
840

gtattataac acaatgcgtg aagattcatt attttctgat atgggttgagt gggtagatga



SEQUENCE LISTING.ST25.txt

900

aaataatata aagcaaaaaa cctctgatgc tagacaaaat tatctccatg aattccaaaa  
960

aatacacaaat gaaaggaaat ttaatgaatt aaaagagatt tttagctttc ctagaattca  
1020

tgacgcctta cctatatcaa aagaaatgag taagctcagc aaccctaaaa ttcctgttta  
1080

tataaatata tgctcaatac cttcaagaat aaaacaactt caatacacta ttggagtact  
1140

aaaaaaccaa tgcgatcatt ttcatattta tcttgatgga tatccagaag tacctgattt  
1200

tataaaaaaa ctagggaata aagcgaccgt tattaattgt caaaacaaaa atgagtctat  
1260

tagagataat ggaaagttaa ttctattaga aaaacttata aaggaaaata aagatggata  
1320

ttatataact tgtgatgatg atatccggta tcctgctgac tacataaaca ctatgataaa  
1380

aaaaattaat aaatacaatg ataaagcagc aattggatta catggtgtta tattcccaag  
1440

tagagtcaac aagtatTTTT catcagacag aattgtctat aattttcaaa aaaccttttag  
1500

aaaatgatac  
1510

<210> 63

<211> 238

<212> PRT

<213> Escherichia coli

<400> 63

SEQUENCE LISTING.ST25.txt

Met	Ile	Val	Ala	Asn	Met	Ser	Ser	Tyr	Pro	Pro	Arg	Lys	Lys	Glu	Leu	1	5	10	15
Val	His	Ser	Ile	Gln	Ser	Leu	His	Ala	Gln	Val	Asp	Lys	Ile	Asn	Leu	20	25	30	
Cys	Leu	Asn	Glu	Phe	Glu	Glu	Ile	Pro	Glu	Glu	Leu	Asp	Gly	Phe	Ser	35	40	45	
Lys	Leu	Asn	Pro	Val	Ile	Pro	Asp	Lys	Asp	Tyr	Lys	Asp	Val	Gly	Lys	50	55	60	
Phe	Ile	Phe	Pro	Cys	Ala	Lys	Asn	Asp	Met	Ile	Val	Leu	Thr	Asp	Asp	65	70	75	80
Asp	Ile	Ile	Tyr	Pro	Pro	Asp	Tyr	Val	Glu	Lys	Met	Leu	Asn	Phe	Tyr	85	90	95	
Asn	Ser	Phe	Ala	Ile	Phe	Asn	Cys	Ile	Val	Gly	Ile	His	Gly	Cys	Ile	100	105	110	
Tyr	Ile	Asp	Ala	Phe	Asp	Gly	Asp	Gln	Ser	Lys	Arg	Lys	Val	Phe	Ser	115	120	125	
Phe	Thr	Gln	Gly	Leu	Leu	Arg	Pro	Arg	Val	Val	Asn	Gln	Leu	Gly	Thr	130	135	140	
Gly	Thr	Val	Phe	Leu	Lys	Ala	Asp	Gln	Leu	Pro	Ser	Leu	Lys	Tyr	Met	145	150	155	160
Asp	Gly	Ser	Gln	Arg	Phe	Val	Asp	Val	Arg	Phe	Ser	Arg	Tyr	Met	Leu	165	170	175	
Glu	Asn	Glu	Ile	Gly	Met	Ile	Cys	Val	Pro	Arg	Glu	Lys	Asn	Trp	Leu	180	185	190	

SEQUENCE LISTING.ST25.txt

Arg Glu Val Ser Ser Gly Ser Met Glu Gly Leu Trp Asn Thr Phe Thr  
195 200 205

Lys Lys Trp Pro Leu Asp Ile Ile Lys Glu Thr Gln Ala Ile Ala Gly  
210 215 220

Tyr Ser Lys Leu Asn Leu Glu Leu Val Tyr Asn Val Glu Gly  
225 230 235

<210> 64

<211> 520

<212> PRT

<213> Escherichia coli

<400> 64

Met Asn Ala Glu Tyr Ile Asn Leu Val Glu Arg Lys Lys Lys Leu Gly  
1 5 10 15

Thr Asn Ile Gly Ala Leu Asp Phe Leu Leu Ser Ile His Lys Glu Lys  
20 25 30

Val Asp Leu Gln His Lys Asn Ser Pro Leu Lys Gly Asn Asp Asn Leu  
35 40 45

Ile His Lys Arg Ile Asn Glu Tyr Asp Asn Val Leu Glu Leu Ser Lys  
50 55 60

Asn Val Ser Ala Gln Asn Ser Gly Asn Glu Phe Ser Tyr Leu Leu Gly  
65 70 75 80

Tyr Ala Asp Ser Leu Arg Lys Val Gly Met Leu Asp Thr Tyr Ile Lys  
85 90 95

SEQUENCE LISTING.ST25.txt

Ile Val Cys Tyr Leu Thr Ile Gln Ser Arg Tyr Phe Lys Asn Gly Glu  
100 105 110

Arg Val Lys Leu Phe Glu His Ile Ser Asn Ala Leu Arg Tyr Ser Arg  
115 120 125

Ser Asp Phe Leu Ile Asn Leu Ile Phe Glu Arg Tyr Ile Glu Tyr Ile  
130 135 140

Asn His Leu Lys Leu Ser Pro Lys Gln Lys Asp Phe Tyr Phe Cys Thr  
145 150 155 160

Lys Phe Ser Lys Phe His Asp Tyr Thr Lys Asn Gly Tyr Lys Tyr Leu  
165 170 175

Ala Phe Asp Asn Gln Ala Asp Ala Gly Tyr Gly Leu Thr Leu Leu Leu  
180 185 190

Asn Ala Asn Asp Asp Met Gln Asp Ser Tyr Asn Leu Leu Pro Glu Gln  
195 200 205

Glu Leu Phe Ile Cys Asn Ala Val Ile Asp Asn Met Asn Ile Tyr Arg  
210 215 220

Ser Gln Phe Asn Lys Cys Leu Arg Lys Tyr Asp Leu Ser Glu Ile Thr  
225 230 235 240

Asp Ile Tyr Pro Asn Lys Ile Ile Leu Gln Gly Ile Lys Phe Asp Lys  
245 250 255

Lys Lys Asn Val Tyr Gly Lys Asp Leu Val Ser Ile Ile Met Ser Val  
260 265 270

Phe Asn Ser Glu Asp Thr Ile Ala Tyr Ser Leu His Ser Leu Leu Asn  
275 280 285

SEQUENCE LISTING.ST25.txt

Gln	Thr	Tyr	Glu	Asn	Ile	Glu	Ile	Leu	Val	Cys	Asp	Asp	Cys	Ser	Ser	290	295	300
Asp	Lys	Ser	Leu	Glu	Ile	Ile	Lys	Ser	Ile	Ala	Tyr	Ser	Ser	Ser	Arg	305	310	315
Val	Lys	Val	Tyr	Ser	Ser	Arg	Lys	Asn	Gln	Gly	Pro	Tyr	Asn	Ile	Arg	325	330	335
Asn	Glu	Leu	Ile	Lys	Lys	Ala	His	Gly	Asn	Phe	Ile	Thr	Phe	Gln	Asp	340	345	350
Ala	Asp	Asp	Leu	Ser	His	Pro	Glu	Arg	Ile	Gln	Arg	Gln	Val	Glu	Val	355	360	365
Leu	Arg	Asn	Asn	Lys	Ala	Val	Ile	Cys	Met	Ala	Asn	Trp	Ile	Arg	Val	370	375	380
Ala	Ser	Asn	Gly	Lys	Ile	Gln	Phe	Phe	Tyr	Asp	Asp	Lys	Ala	Thr	Arg	385	390	395
Met	Ser	Val	Val	Ser	Ser	Met	Ile	Lys	Lys	Asp	Ile	Phe	Ala	Thr	Val	405	410	415
Gly	Gly	Tyr	Arg	Gln	Ser	Leu	Ile	Gly	Ala	Asp	Thr	Glu	Phe	Tyr	Glu	420	425	430
Thr	Val	Ile	Met	Arg	Tyr	Gly	Arg	Glu	Ser	Ile	Val	Arg	Leu	Leu	Gln	435	440	445
Pro	Leu	Ile	Leu	Gly	Leu	Trp	Gly	Asp	Ser	Gly	Leu	Thr	Arg	Asn	Lys	450	455	460
Gly	Thr	Glu	Ala	Leu	Pro	Asp	Gly	Tyr	Ile	Ser	Gln	Ser	Arg	Arg	Glu	465	470	475

SEQUENCE LISTING.ST25.txt

Tyr Ser Asp Ile Ala Ala Arg Gln Arg Val Leu Gly Lys Ser Ile Val  
                     485                    490                    495

Ser Asp Lys Asp Val Arg Gly Leu Leu Ser Arg Tyr Gly Leu Phe Lys  
                     500                    505                    510

Asp Val Ser Gly Ile Ile Glu Gln  
                     515                    520

<210> 65

<211> 746

<212> PRT

<213> Mus musculus

<400> 65

Met Gln Ala Lys Lys Arg Tyr Phe Ile Leu Leu Ser Ala Gly Ser Cys  
   1                    5                    10                    15

Leu Ala Leu Leu Phe Tyr Phe Gly Gly Val Gln Phe Arg Ala Ser Arg  
                     20                    25                    30

Ser His Ser Arg Arg Glu Glu His Ser Gly Arg Asn Gly Leu His Gln  
                     35                    40                    45

Pro Ser Pro Asp His Phe Trp Pro Arg Phe Pro Asp Ala Leu Arg Pro  
                     50                    55                    60

Phe Phe Pro Trp Asp Gln Leu Glu Asn Glu Asp Ser Ser Val His Ile  
   65                    70                    75                    80

Ser Pro Arg Gln Lys Arg Asp Ala Asn Ser Ser Ile Tyr Lys Gly Lys  
                     85                    90                    95

SEQUENCE LISTING.ST25.txt

Lys Cys Arg Met Glu Ser Cys Phe Asp Phe Thr Leu Cys Lys Lys Asn  
100 105 110

Gly Phe Lys Val Tyr Val Tyr Pro Gln Gln Lys Gly Glu Lys Ile Ala  
115 120 125

Glu Ser Tyr Gln Asn Ile Leu Ala Ala Ile Glu Gly Ser Arg Phe Tyr  
130 135 140

Thr Ser Asp Pro Ser Gln Ala Cys Leu Phe Val Leu Ser Leu Asp Thr  
145 150 155 160

Leu Asp Arg Asp Gln Leu Ser Pro Gln Tyr Val His Asn Leu Arg Ser  
165 170 175

Lys Val Gln Ser Leu His Leu Trp Asn Asn Gly Arg Asn His Leu Ile  
180 185 190

Phe Asn Leu Tyr Ser Gly Thr Trp Pro Asp Tyr Thr Glu Asp Val Gly  
195 200 205

Phe Asp Ile Gly Gln Ala Met Leu Ala Lys Ala Ser Ile Ser Thr Glu  
210 215 220

Asn Phe Arg Pro Asn Phe Asp Val Ser Ile Pro Leu Phe Ser Lys Asp  
225 230 235 240

His Pro Arg Thr Gly Gly Glu Arg Gly Phe Leu Lys Phe Asn Thr Ile  
245 250 255

Pro Pro Leu Arg Lys Tyr Met Leu Val Phe Lys Gly Lys Arg Tyr Leu  
260 265 270

Thr Gly Ile Gly Ser Asp Thr Arg Asn Ala Leu Tyr His Val His Asn  
275 280 285

SEQUENCE LISTING.ST25.txt

Gly	Glu	Asp	Val	Leu	Leu	Leu	Thr	Thr	Cys	Lys	His	Gly	Lys	Asp	Trp	290	295	300
Gln	Lys	His	Lys	Asp	Ser	Arg	Cys	Asp	Arg	Asp	Asn	Thr	Glu	Tyr	Glu	305	310	315
Lys	Tyr	Asp	Tyr	Arg	Glu	Met	Leu	His	Asn	Ala	Thr	Phe	Cys	Leu	Val	325	330	335
Pro	Arg	Gly	Arg	Arg	Leu	Gly	Ser	Phe	Arg	Phe	Leu	Glu	Ala	Leu	Gln	340	345	350
Ala	Ala	Cys	Val	Pro	Val	Met	Leu	Ser	Asn	Gly	Trp	Glu	Leu	Pro	Phe	355	360	365
Ser	Glu	Val	Ile	Asn	Trp	Asn	Gln	Ala	Ala	Val	Ile	Gly	Asp	Glu	Arg	370	375	380
Leu	Leu	Leu	Gln	Ile	Pro	Ser	Thr	Ile	Arg	Ser	Ile	His	Gln	Asp	Lys	385	390	395
Ile	Leu	Ala	Leu	Arg	Gln	Gln	Thr	Gln	Phe	Leu	Trp	Glu	Ala	Tyr	Phe	405	410	415
Ser	Ser	Val	Glu	Lys	Ile	Val	Leu	Thr	Thr	Leu	Glu	Ile	Ile	Gln	Asp	420	425	430
Arg	Ile	Phe	Lys	His	Ile	Ser	Arg	Asn	Ser	Leu	Ile	Trp	Asn	Lys	His	435	440	445
Pro	Gly	Gly	Leu	Phe	Val	Leu	Pro	Gln	Tyr	Ser	Ser	Tyr	Leu	Gly	Asp	450	455	460
Phe	Pro	Tyr	Tyr	Tyr	Ala	Asn	Leu	Gly	Leu	Lys	Pro	Pro	Ser	Lys	Phe	465	470	475



SEQUENCE LISTING.ST25.txt

Thr Ala Val Ile His Ala Val Thr Pro Leu Val Ser Gln Ser Gln Pro  
485 490 495

Val Leu Lys Leu Leu Val Ala Ala Ala Lys Ser Gln Tyr Cys Ala Gln  
500 505 510

Ile Ile Val Leu Trp Asn Cys Asp Lys Pro Leu Pro Ala Lys His Arg  
515 520 525

Trp Pro Ala Thr Ala Val Pro Val Ile Val Ile Glu Gly Glu Ser Lys  
530 535 540

Val Met Ser Ser Arg Phe Leu Pro Tyr Asp Asn Ile Ile Thr Asp Ala  
545 550 555 560

Val Leu Ser Leu Asp Glu Asp Thr Val Leu Ser Thr Thr Glu Val Asp  
565 570 575

Phe Ala Phe Thr Val Trp Gln Ser Phe Pro Glu Arg Ile Val Gly Tyr  
580 585 590

Pro Ala Arg Ser His Phe Trp Asp Asn Ser Lys Glu Arg Trp Gly Tyr  
595 600 605

Thr Ser Lys Trp Thr Asn Asp Tyr Ser Met Val Leu Thr Gly Ala Ala  
610 615 620

Ile Tyr His Lys Tyr Tyr His Tyr Leu Tyr Ser His Tyr Leu Pro Ala  
625 630 635 640

Ser Leu Lys Asn Met Val Asp Gln Leu Ala Asn Cys Glu Asp Ile Leu  
645 650 655

Met Asn Phe Leu Val Ser Ala Val Thr Lys Leu Pro Pro Ile Lys Val  
660 665 670

SEQUENCE LISTING.ST25.txt

Thr Gln Lys Lys Gln Tyr Lys Glu Thr Met Met Gly Gln Thr Ser Arg  
675 680 685

Ala Ser Arg Trp Ala Asp Pro Asp His Phe Ala Gln Arg Gln Ser Cys  
690 695 700

Met Asn Thr Phe Ala Ser Trp Phe Gly Tyr Met Pro Leu Ile His Ser  
705 710 715 720

Gln Met Arg Leu Asp Pro Val Leu Phe Lys Asp Gln Val Ser Ile Leu  
725 730 735

Arg Lys Lys Tyr Arg Asp Ile Glu Arg Leu  
740 745

<210> 66

<211> 718

<212> PRT

<213> Mus musculus

<400> 66

Met Cys Ala Ser Val Lys Ser Asn Ile Arg Gly Pro Ala Leu Ile Pro  
1 5 10 15

Arg Met Lys Thr Lys His Arg Ile Tyr Tyr Val Thr Leu Phe Ser Ile  
20 25 30

Val Leu Leu Gly Leu Ile Ala Thr Gly Met Phe Gln Phe Trp Pro His  
35 40 45

Ser Ile Glu Ser Ser Ser Asp Gly Gly Val Glu Lys Arg Ser Ile Arg  
50 55 60

SEQUENCE LISTING.ST25.txt

Glu Val Pro Val Val Arg Leu Pro Thr Asp Ser Pro Ile Pro Glu Arg  
65 70 75 80

Gly Asp Leu Ser Cys Arg Met His Thr Cys Phe Asp Val Tyr Arg Cys  
85 90 95

Gly Phe Asn Pro Lys Asn Lys Ile Lys Val Tyr Ile Tyr Pro Leu Lys  
100 105 110

Lys Tyr Val Asp Asp Ala Gly Val Pro Val Ser Ser Ala Ile Ser Arg  
115 120 125

Glu Tyr Asn Glu Leu Leu Thr Ala Ile Ser Asp Ser Asp Tyr Tyr Thr  
130 135 140

Asp Asp Ile Asn Arg Ala Cys Leu Phe Val Pro Ser Ile Asp Val Leu  
145 150 155 160

Asn Gln Asn Pro Leu Arg Ile Lys Glu Thr Ala Gln Ala Leu Ala Gln  
165 170 175

Leu Ser Arg Trp Asp Arg Gly Thr Asn His Leu Leu Phe Asn Met Leu  
180 185 190

Pro Gly Ala Pro Pro Asp Tyr Asn Thr Ala Leu Asp Val Pro Arg Asp  
195 200 205

Arg Ala Leu Leu Ala Gly Gly Gly Phe Ser Thr Trp Thr Tyr Arg Gln  
210 215 220

Gly Tyr Asp Val Ser Ile Pro Val Phe Ser Pro Leu Ser Ala Glu Met  
225 230 235 240

Ala Leu Pro Glu Lys Ala Pro Gly Pro Arg Arg Tyr Phe Leu Leu Ser  
245 250 255

SEQUENCE LISTING.ST25.txt

Ser Gln Met Ala Ile His Pro Glu Tyr Arg Glu Glu Leu Glu Ala Leu  
260 265 270

Gln Ala Lys His Gln Glu Ser Val Leu Val Leu Asp Lys Cys Thr Asn  
275 280 285

Leu Ser Glu Gly Val Leu Ser Val Arg Lys Arg Cys His Gln His Gln  
290 295 300

Val Phe Asp Tyr Pro Gln Val Leu Gln Glu Ala Thr Phe Cys Thr Val  
305 310 315 320

Leu Arg Arg Ala Arg Leu Gly Gln Ala Val Leu Ser Asp Val Leu Gln  
325 330 335

Ala Gly Cys Val Pro Val Val Ile Ala Asp Ser Tyr Ile Leu Pro Phe  
340 345 350

Ser Glu Val Leu Asp Trp Lys Lys Ala Ser Val Val Val Pro Glu Glu  
355 360 365

Lys Met Ser Asp Val Tyr Ser Ile Leu Gln Asn Ile Pro Gln Arg Gln  
370 375 380

Ile Glu Glu Met Gln Arg Gln Ala Arg Trp Phe Trp Glu Ala Tyr Phe  
385 390 395 400

Gln Ser Ile Lys Ala Ile Ala Leu Ala Thr Leu Gln Ile Ile Asn Asp  
405 410 415

Arg Ile Tyr Pro Tyr Ala Ala Ile Ser Tyr Glu Glu Trp Asn Asp Pro  
420 425 430

Pro Ala Val Lys Trp Ala Ser Val Ser Asn Pro Leu Phe Leu Pro Leu  
435 440 445

SEQUENCE LISTING.ST25.txt

Ile	Pro	Pro	Gln	Ser	Gln	Gly	Phe	Thr	Ala	Ile	Val	Leu	Thr	Tyr	Asp	450	455	460	
Arg	Val	Glu	Ser	Leu	Phe	Arg	Val	Ile	Thr	Glu	Val	Ser	Lys	Val	Pro	465	470	475	480
Ser	Leu	Ser	Lys	Leu	Leu	Val	Val	Trp	Asn	Asn	Gln	Asn	Lys	Asn	Pro	485	490	495	
Pro	Glu	Glu	Ser	Leu	Trp	Pro	Lys	Ile	Arg	Val	Pro	Leu	Lys	Val	Val	500	505	510	
Arg	Thr	Ala	Glu	Asn	Lys	Leu	Ser	Asn	Arg	Phe	Phe	Pro	Tyr	Asp	Glu	515	520	525	
Ile	Glu	Thr	Glu	Ala	Val	Leu	Ala	Ile	Asp	Asp	Asp	Ile	Ile	Met	Leu	530	535	540	
Thr	Ser	Asp	Glu	Leu	Gln	Phe	Gly	Tyr	Glu	Val	Trp	Arg	Glu	Phe	Pro	545	550	555	560
Asp	Arg	Leu	Val	Gly	Tyr	Pro	Gly	Arg	Leu	His	Leu	Trp	Asp	His	Glu	565	570	575	
Met	Asn	Lys	Trp	Lys	Tyr	Glu	Ser	Glu	Trp	Thr	Asn	Glu	Val	Ser	Met	580	585	590	
Val	Leu	Thr	Gly	Ala	Ala	Phe	Tyr	His	Lys	Tyr	Phe	Asn	Tyr	Leu	Tyr	595	600	605	
Thr	Tyr	Lys	Met	Pro	Gly	Asp	Ile	Lys	Asn	Trp	Val	Asp	Ala	His	Met	610	615	620	
Asn	Cys	Glu	Asp	Ile	Ala	Met	Asn	Phe	Leu	Val	Ala	Asn	Val	Thr	Gly	625	630	635	640

SEQUENCE LISTING.ST25.txt

Lys Ala Val Ile Lys Val Thr Pro Arg Lys Lys Phe Lys Cys Pro Glu  
645 650 655

Cys Thr Ala Ile Asp Gly Leu Ser Leu Asp Gln Thr His Met Val Glu  
660 665 670

Arg Ser Glu Cys Ile Asn Lys Phe Ala Ser Val Phe Gly Thr Met Pro  
675 680 685

Leu Lys Val Val Glu His Arg Ala Asp Pro Val Leu Tyr Lys Asp Asp  
690 695 700

Phe Pro Glu Lys Leu Lys Ser Phe Pro Asn Ile Gly Ser Leu  
705 710 715

<210> 67

<211> 76

<212> PRT

<213> Artificial Sequence

<220>

<223> motif

<220>

<221> MISC\_FEATURE

<222> (4)..(4)

<223> ANY AMINO ACID

<220>

<221> MISC\_FEATURE

SEQUENCE LISTING.ST25.txt

<222> (6)..(6)

<223> Leu or Ile

<220>

<221> MISC\_FEATURE

<222> (8)..(11)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (14)..(14)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (15)..(15)

<223> Ser or Thr

<220>

<221> MISC\_FEATURE

<222> (16)..(16)

<223> Ser or Thr

<220>

SEQUENCE LISTING.ST25.txt

<221> MISC\_FEATURE

<222> (18)..(18)

<223> Lys or Asn

<220>

<221> MISC\_FEATURE

<222> (19)..(19)

<223> Thr or Ser

<220>

<221> MISC\_FEATURE

<222> (20)..(25)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (28)..(28)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (29)..(31)

<223> Ser or Thr



SEQUENCE LISTING.ST25.txt

<220>

<221> MISC\_FEATURE

<222> (32)..(32)

<223> Lys or Arg

<220>

<221> MISC\_FEATURE

<222> (34)..(34)

<223> Lys or Arg

<220>

<221> MISC\_FEATURE

<222> (35)..(40)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (42)..(42)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (44)..(44)

<223> any amino acid

SEQUENCE LISTING.ST25.txt

<220>

<221> MISC\_FEATURE

<222> (46)..(61)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (65)..(65)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (68)..(68)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (69)..(69)

<223> Cys or Ser

<220>

<221> MISC\_FEATURE

<222> (71)..(71)

SEQUENCE LISTING.ST25.txt

<223> His or Pro

<220>

<221> MISC\_FEATURE

<222> (75)..(75)

<223> any amino acid

<400> 67

Gln	Thr	Tyr	Xaa	Asn	Xaa	Glu	Xaa	Xaa	Xaa	Xaa	Asp	Asp	Xaa	Xaa	Xaa
1				5					10					15	

Asp	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Ile	Ala	Xaa	Xaa	Xaa	Xaa	Xaa
			20					25						30		

Val	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Asn	Xaa	Gly	Xaa	Tyr	Xaa	Xaa	Xaa
		35					40					45			

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Phe	Gln	Asp
		50					55					60				

Xaa	Asp	Asp	Xaa	Xaa	His	Xaa	Glu	Arg	Ile	Xaa	Arg
65					70					75	

<210> 68

<211> 102

<212> PRT

<213> Artificial Sequence

<220>

SEQUENCE LISTING.ST25.txt

<223> motif

<220>

<221> MISC\_FEATURE

<222> (1)..(1)

<223> Lys or Arg

<220>

<221> MISC\_FEATURE

<222> (3)..(3)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (8)..(19)

<223> each position may be any amino acid

<220>

<221> MISC\_FEATURE

<222> (20)..(24)

<223> may be missing from sequence; each position may be any amino acid

<220>

<221> MISC\_FEATURE

<222> (20)..(24)

SEQUENCE LISTING.ST25.txt

<223> all or part of sequence comprising residues 20-24 may be missing;

each position may be any amino acid

<220>

<221> MISC\_FEATURE

<222> (29)..(29)

<223> Arg or Ile

<220>

<221> MISC\_FEATURE

<222> (32)..(32)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (35)..(37)

<223> any amino acid

<220>

<221> MISC\_FEATURE

<222> (39)..(84)

<223> each position may be any amino acid

<220>

SEQUENCE LISTING.ST25.txt

<221> MISC\_FEATURE

<222> (85)..(94)

<223> all or part of sequence comprising residues 85-94 may be missing;

each position may be any amino acid

<220>

<221> MISC\_FEATURE

<222> (96)..(96)

<223> any amino acid

<400> 68

Xaa	Asp	Xaa	Gly	Lys	Phe	Ile	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
1				5					10						15	

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Asp	Asp	Asp	Ile	Xaa	Tyr	Pro	Xaa
			20						25					30		

Asp	Tyr	Xaa	Xaa	Xaa	Met	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
		35					40						45			

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
		50					55					60				

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
65						70					75					80

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Val	Asn	Xaa	
				85					90					95		

Leu Gly Thr Gly Thr Val

SEQUENCE LISTING.ST25.txt

100

<210> 69

<211> 1854

<212> DNA

<213> Pasteurella multocida

<400> 69

atgagcttat ttaaactgtc tactgagcta ttaagtcag gaaactataa agatgcacta  
60

actctatatg aaaatatagc taaaatttat ggttcagaaa gccttggtta atataatatt  
120

gatatatgta aaaaaaatat aacacaatca aaaagtaata aaatagaaga agataatatt  
180

tctggagaaa acaaattttc agtatcaata aaagatctat ataacgaaat aagcaatagt  
240

gaattaggga ttacaaaaga aagactagga gccccccctc tagtcagtat tataatgact  
300

tctcataata cagaaaaatt cattgaagcc tcaattaatt cactattatt gcaaacatac  
360

aataacttag aagttatcgt ttagatgat tatagcacag ataaaacatt tcagatcgca  
420

tccagaatag caaactctac aagtaaagta aaaacattcc gattaaactc aaatctaggg  
480

acatactttg cgaaaaatac aggaatttta aagtctaaag gagatattat tttctttcag  
540

gatagcgatg atgtatgtca ccatgaaaga atcgaaagat gtgttaatgc attattatcg  
600

aataaagata atatatgtgt tagatgtgca tattctagaa taaatctaga aacacaaaat  
660

ataataaaaag ttaatgataa taaatacaaa ttaggattaa taactttagg cgtttataga

SEQUENCE LISTING.ST25.txt

720

aaagtattta atgaaattgg tttttttaac tgcacaacca aagcatcgga tgatgaattt  
780

tatcatagaa taattaaata ctatggtaaa aataggataa ataacttatt tctaccactg  
840

tattataaca caatgcgtga agattcatta ttttctgata tggttgagtg ggtagatgaa  
900

aataatataa agcaaaaaac ctctgatgct agacaaaatt atctccatga attccaaaaa  
960

atacacaatg aaaggaaatt aatgaatta aaagagattt ttagctttcc tagaattcat  
1020

gacgccttac ctatatcaaa agaaatgagt aagctcagca accctaaaat tcctgtttat  
1080

ataaatatat gctcaatacc ttcaagaata aaacaacttc aatacactat tggagtacta  
1140

aaaaaccaat gcgatcattt tcatatttat cttgatggat atccagaagt acctgatttt  
1200

ataaaaaaac tagggaataa agcgaccggtt attaattgtc aaaacaaaaa tgagtctatt  
1260

agagataatg gaaagtttat tctattagaa aaacttataa aggaaaataa agatggatat  
1320

tatataactt gtgatgatga tatccggtat cctgctgact acataaacac tatgataaaa  
1380

aaaattaata aatacaatga taaagcagca attggattac atggtgttat attcccaagt  
1440

agagtcaaca agtatTTTTc atcagacaga attgtctata attttcaaaa accttagaa  
1500

aatgatactg ctgtaaatat attaggaact ggaactgttg ctttagagt atctattttt  
1560

aataaatttt ctctatctga ttttgagcat cctggcatgg tagatatcta tttttctata  
1620

ctatgtaaga aaaacaatat actccaagtt tgtatatcac gaccatcgaa ttggctaaca



SEQUENCE LISTING.ST25.txt

1680

gaagataaca aaaacactga gaccttattt catgaattcc aaaatagaga tgaaatacaa  
1740

agtaaactca ttatttcaaa caacccttgg ggataactcaa gtatatatcc attattaaat  
1800

aataatgcta attattctga acttattccg tgtttatctt tttataacga gtaa  
1854

<210> 70

<211> 617

<212> PRT

<213> Pasteurella multocida

<400> 70

Met	Ser	Leu	Phe	Lys	Arg	Ala	Thr	Glu	Leu	Phe	Lys	Ser	Gly	Asn	Tyr
1				5					10					15	

Lys	Asp	Ala	Leu	Thr	Leu	Tyr	Glu	Asn	Ile	Ala	Lys	Ile	Tyr	Gly	Ser
			20					25						30	

Glu	Ser	Leu	Val	Lys	Tyr	Asn	Ile	Asp	Ile	Cys	Lys	Lys	Asn	Ile	Thr
		35					40					45			

Gln	Ser	Lys	Ser	Asn	Lys	Ile	Glu	Glu	Asp	Asn	Ile	Ser	Gly	Glu	Asn
	50					55					60				

Lys	Phe	Ser	Val	Ser	Ile	Lys	Asp	Leu	Tyr	Asn	Glu	Ile	Ser	Asn	Ser
65					70					75					80

Glu	Leu	Gly	Ile	Thr	Lys	Glu	Arg	Leu	Gly	Ala	Pro	Pro	Leu	Val	Ser
				85					90					95	

SEQUENCE LISTING.ST25.txt

Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile  
100 105 110

Asn Ser Leu Leu Leu Gln Thr Tyr Asn Asn Leu Glu Val Ile Val Val  
115 120 125

Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala  
130 135 140

Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly  
145 150 155 160

Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile  
165 170 175

Ile Phe Phe Gln Asp Ser Asp Asp Val Cys His His Glu Arg Ile Glu  
180 185 190

Arg Cys Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg  
195 200 205

Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val  
210 215 220

Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu Gly Val Tyr Arg  
225 230 235 240

Lys Val Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys Ala Ser  
245 250 255

Asp Asp Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg  
260 265 270

Ile Asn Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr Met Arg Glu Asp  
275 280 285

SEQUENCE LISTING.ST25.txt

Ser Leu Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys  
290 295 300

Gln Lys Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys  
305 310 315 320

Ile His Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu Ile Phe Ser Phe  
325 330 335

Pro Arg Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu  
340 345 350

Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser  
355 360 365

Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys  
370 375 380

Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe  
385 390 395 400

Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys  
405 410 415

Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu  
420 425 430

Ile Lys Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Asp Ile  
435 440 445

Arg Tyr Pro Ala Asp Tyr Ile Asn Thr Met Ile Lys Lys Ile Asn Lys  
450 455 460

Tyr Asn Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser  
465 470 475 480

SEQUENCE LISTING.ST25.txt

Arg Val Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val Tyr Asn Phe Gln  
485 490 495

Lys Pro Leu Glu Asn Asp Thr Ala Val Asn Ile Leu Gly Thr Gly Thr  
500 505 510

Val Ala Phe Arg Val Ser Ile Phe Asn Lys Phe Ser Leu Ser Asp Phe  
515 520 525

Glu His Pro Gly Met Val Asp Ile Tyr Phe Ser Ile Leu Cys Lys Lys  
530 535 540

Asn Asn Ile Leu Gln Val Cys Ile Ser Arg Pro Ser Asn Trp Leu Thr  
545 550 555 560

Glu Asp Asn Lys Asn Thr Glu Thr Leu Phe His Glu Phe Gln Asn Arg  
565 570 575

Asp Glu Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn Pro Trp Gly Tyr  
580 585 590

Ser Ser Ile Tyr Pro Leu Leu Asn Asn Asn Ala Asn Tyr Ser Glu Leu  
595 600 605

Ile Pro Cys Leu Ser Phe Tyr Asn Glu  
610 615

<210> 71

<211> 2112

<212> DNA

<213> Pasteurella multocida

<400> 71

atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc

SEQUENCE LISTING.ST25.txt

60

aaattatttg aaaagtcggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc  
120

aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat  
180

aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt  
240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg  
300

aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca  
360

aaagattttc ccaaagatct ggtttttagcg cctttacctg atcatgttaa tgattttaca  
420

tggtacaaaa agcgaaagaa aagacttggc ataaaacctg aacatcaaca tgttggtcct  
480

tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta  
540

gtaaaccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa  
600

gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa  
660

aaagataacg gttttcaagc cagtgccgct cggaatatgg gattacgctt agcaaaatat  
720

gactttattg gcttactcga ctgtgatatg gcgccaatc cattatgggt tcattcttat  
780

gttgagagc tattagaaga tgatgattta acaatcattg gtccaagaaa atacatcgat  
840

acacaacata ttgacccaaa agacttctta aataacgcga gtttgcttga atcattacca  
900

gaagtgaaaa ccaataatag tgttgccgca aaagggaag gaacagtttc tctggattgg  
960

cgcttagaac aattcgaaaa aacagaaaat ctccgcttat ccgattcgcc tttccgtttt

SEQUENCE LISTING.ST25.txt

1020

tttgcggcgg gtaatgttgc tttcgctaaa aaatggctaa ataaatccgg tttctttgat  
1080

gaggaattta atcactgggg tggagaagat gtggaatttg gatatcgctt attccgttac  
1140

ggtagtttct ttaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa  
1200

gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaaag  
1260

gtcccttata tctatagaaa actttttacca atagaagatt cgcatatcaa tagagtacct  
1320

ttagtttcaa tttatatccc agcttataac tgtgcaaact atattcaacg ttgcgtagat  
1380

agtgcactga atcagactgt tgttgatctc gaggtttgta tttgtaacga tggttcaaca  
1440

gataatacct tagaagtgat caataagctt tatggtaata atcctagggt acgcatcatg  
1500

tctaaaccaa atggcggaat agcctcagca tcaaagcag ccgtttcttt tgctaaaggt  
1560

tattacattg ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt  
1620

ttaaaagaat ttttaaaaga taaaacgcta gcttgtgttt ataccactaa tagaaacgtc  
1680

aatccggatg gtagcttaat cgctaattgg tacaattggc cagaattttc acgagaaaaa  
1740

ctcacaacgg ctatgattgc tcaccacttt agaattgttca cgattagagc ttggcattta  
1800

actgatggat tcaatgaaaa aattgaaaat gccgtagact atgacatggt cctcaaactc  
1860

agtgaagttg gaaaatttaa acatcttaat aaaatctgct ataaccgtgt attacatggg  
1920

gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgtagtcaat